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THE ENVIRONMENTAL EVALUATION WORK GROUP FY 1979 STUDIES OF THE WINTER NAVIGATION DEMONSTRATION PROGRAM

EFFECTS OF SHIP-INDUCED WAVES IN AN ICE ENVIRONMENT ON THE ST. MARYS RIVER ECOSYSTEM

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A study was conducted at selected sites in the St. Marys River to provide a base of information for evaluating the effects of ship-induced, under-ice surge waves, created by vessel passage in the adjacent ice-covered navigation channel on fish, fish-food organisms, and fish habitat at those sites. This report evaluates the information developed during the study and, with other relevant materials available, renders judgements, where possible, on the effect and impact of under-ice surge waves caused by vessels on the fish, fish-food organisms, and fish habitat in the St. Marys River.

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EXECUTIVE SUMMARY

1. On January 25, 1978 representatives of the U.S. Fish and Wildlife Service's Division of Ecological Service (FWS-ES), the Michigan Department of Natural Resources, the Detroit District, U.S. Army Corps of Engineers (COE), and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), witnessed the ramparting of ice blocks at the shoreline and the hydraulic transport of sediments and aquatic biota onto shore ice, during the passage of an ore carrier off Frechette Point in the St. Marys River; this event generated interest in an investigation of the effects of vessel-induced, under-ice surge and drawdown waves in Great Lakes connecting channels.

2. In response to requests received in November-December 1978 from FWS-ES and the COE, the Great Lakes Fishery Laboratory (GLFL) agreed to undertake a COE-funded study during January-April 1979 at selected sites in the St. Marys River, to provide a base of information for evaluating the effects on fish, fish-food organisms, and fish habitat at those sites of ship-induced, under-ice surge waves, created by vessel passage in the adjacent ice-covered navigation channel.

3. Sampling was conducted at Frechette Point and Six Mile Point in the St. Marys River during January 16-20, February 13-19, and March 13-18, when there was solid ice cover, and during April 17-21, immediately after the solid ice cover had been broken up by heavy vessel traffic.

4. Macroinvertebrates of 56 taxa were identified in 75 Ponar grab samples taken during January-April at Frechette Point and Six Mile Point. The most abundant organisms were Chronomidae (midge larvae), Oligochaeta (worms), and Gastropoda (snails); collectively they comprised about 67% of the total number of organisms collected. Pelecypoda (fingernail clams), Amphipoda (scuds), Polychaeta, Ephemeroptera (mayflies), and Trichoptera (caddisflies) were common in all samples and collectively made up about 22% of the total. The density of benthic macroinvertebrates (all taxa combined) for all stations and months was 14,125.8/m^2.

5. One-way analysis of variance tests (ANOVA) revealed no significant differences ($\alpha = 0.05$) in mean density of benthic macroinvertebrates among samples collected at different locations, water depths, and months, but subsequent evaluation of the power of these tests showed they would have failed to detect a significant difference in mean macroinvertebrate densities between locations 45% of the time, between depths 60% of the time, and between months 70% of the time. An unequivocal demonstration of effect (or no effect) would have required analysis of additional samples to improve the power of the ANOVAs, and probably also the collection of additional unaffected baseline data during a winter or series of winters when there was no vessel traffic in the study area.

6. Drift nets fished 98 times at Frechette Point and Six Mile Point during February 15-April 21, 1979, captured macroinvetebrates representing 24 taxa, aquatic macrophytes (Elodea), detritus, planktonic microcrustacea, and fish, but no fish eggs. Examination of the drift net fishing records and the records of vessel passages through the study area revealed a large increase in the amount of drift occurred as a result of vessel passage during the period of solid ice cover. Comparison of drift net catches in March when there was solid ice cover and moderate vessel traffic with catches in April when there was heavy floe ice and very heavy vessel traffic suggests the effect of vessel passage on drift was greater when solid ice cover was present.

7. The significance of the observed vessel-induced drift cannot be demonstrated with the available data. However, the biota and detritus represented in the drift net catches may constitute an energy resource that is important to production in the portion of the St. Marys River covered by the study. The accelerated transport of this material through the system in winter, when production approaches the annual minimum may result in a considerable energy loss to the portion of the system from which the drift material was transported.

8. A total of 132 light penetration measurements made at different levels in the water column suggested that vessel passage increased turbidity; they also suggested that the disturbance of the sediments by vessel passage was less when solid ice cover was replaced with heavy floe ice cover.

9. A total of 73 fish representing seven species was caught in gillnets, fyke nets, and traps during January-April. White suckers dominated the catch (76.7%), followed by burbot and sculpin (each at 6.8%); other species taken included yellow perch, lake herring, northern pike, longnose sucker, and ninespine stickleback. Too few fish were collected to determine if vessel passage affected fish distribution or abundance in the study area; none of the fish we collected exhibited any anatomical anomalies that we could attribute to the effects of vessel passage. The burbot was the only winter-spawning fish that we collected in the study area, and we have no evidence to indicate that burbot spawned in the study area.

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INTRODUCTION

On January 25, 1978, during an inspection tour of the St. Marys River, representatives of the U.S. Fish and Wildlife Service's Division of Ecological Service (FWS-ES), the Michigan Department of Natural Resources, the Detroit District, U.S. Army Corps of Engineers (COE), and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), witnessed the passage of the ore carrier, Philip R. Clarke, off Frechette Point. The vessel, which was traveling at a relatively high speed (11.4 mph), produced rather marked effects on the nearshore area including the ramparting of ice blocks at the shoreline and the hydraulic transport of sediments and aquatic biota onto shore ice.

In response to requests received in November-December 1978 from FWS-ES and COE, the FWS Great Lakes Fishery Laboratory (GLFL) agreed to undertake a COE-funded study during January-April 1979 at selected sites in Lake Nicolet, the St. Marys River, to provide a base of information for evaluating the effects on fish, fish-food organisms, and fish habitat at those sites, of ship-induced, under-ice surge waves, created by vessel passage in the adjacent ice-covered navigation channel. The GLFL also agreed to evaluate the information developed during the study, and other relevant materials that were available, and render judgments, where possible, regarding the effect and impact of ship-induced, under-ice surge waves on the above-mentioned biota and their habitat.

As requested by COE, this study was performed under a Memorandum of Agreement between GLFL and the Great Lakes Basin Commission (GLBC), which acted as the Environmental Studies Coordinator for some of the winter navigation-related research funded by COE. According to the terms of the Memorandum of Agreement (GLBC-79-5110) some of the information needed by GLFL to select the study locations and sites and evaluate the impact of vessel passage on the biota of the St. Marys River was to be supplied by CRREL and by Lake Superior State College, who were also under contract to GLBC.

MATERIALS AND METHODS

The general study area selected by COE (Figure 1) is located in the U.S. waters of the St. Marys River in a 25.7 mile stretch of the river identified by CRREL and COE as an area most likely to experience impact from winter navigation. Two locations within the general study area were identified by CRREL as being particularly susceptible to impact by ship-induced, under-ice surge waves; these locations were Frechette Point and Six Mile Point (Figure 2). A third location, Ninemile Point, (not shown on Figure 1), was also originally identified by CRREL for study. We conducted limited sampling (for macrozoobenthos) at Ninemile Point at the beginning of the study, but because of its inaccessibility (in winter) were forced to exclude that location from further study.

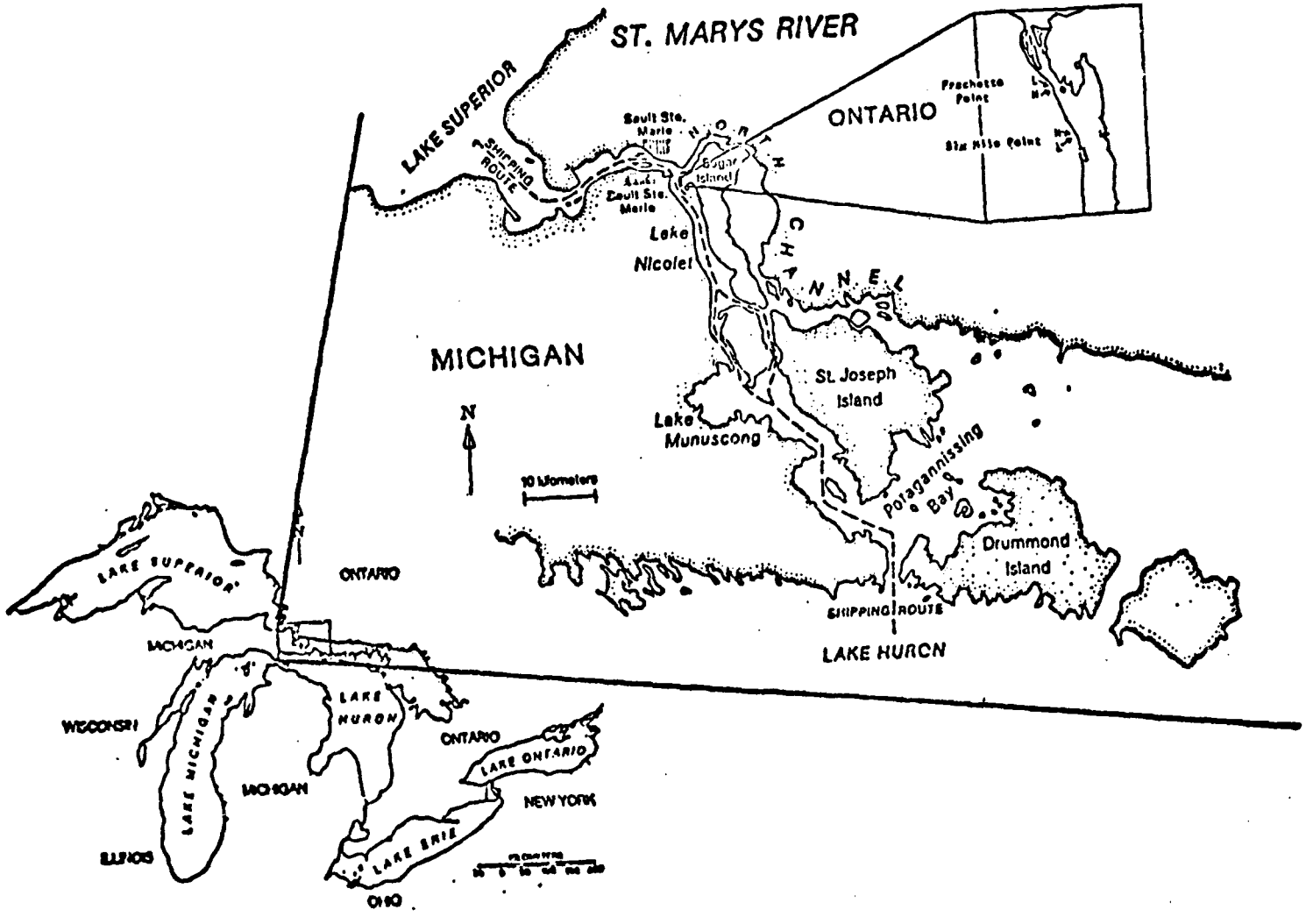

Figure 1. Location of study area.

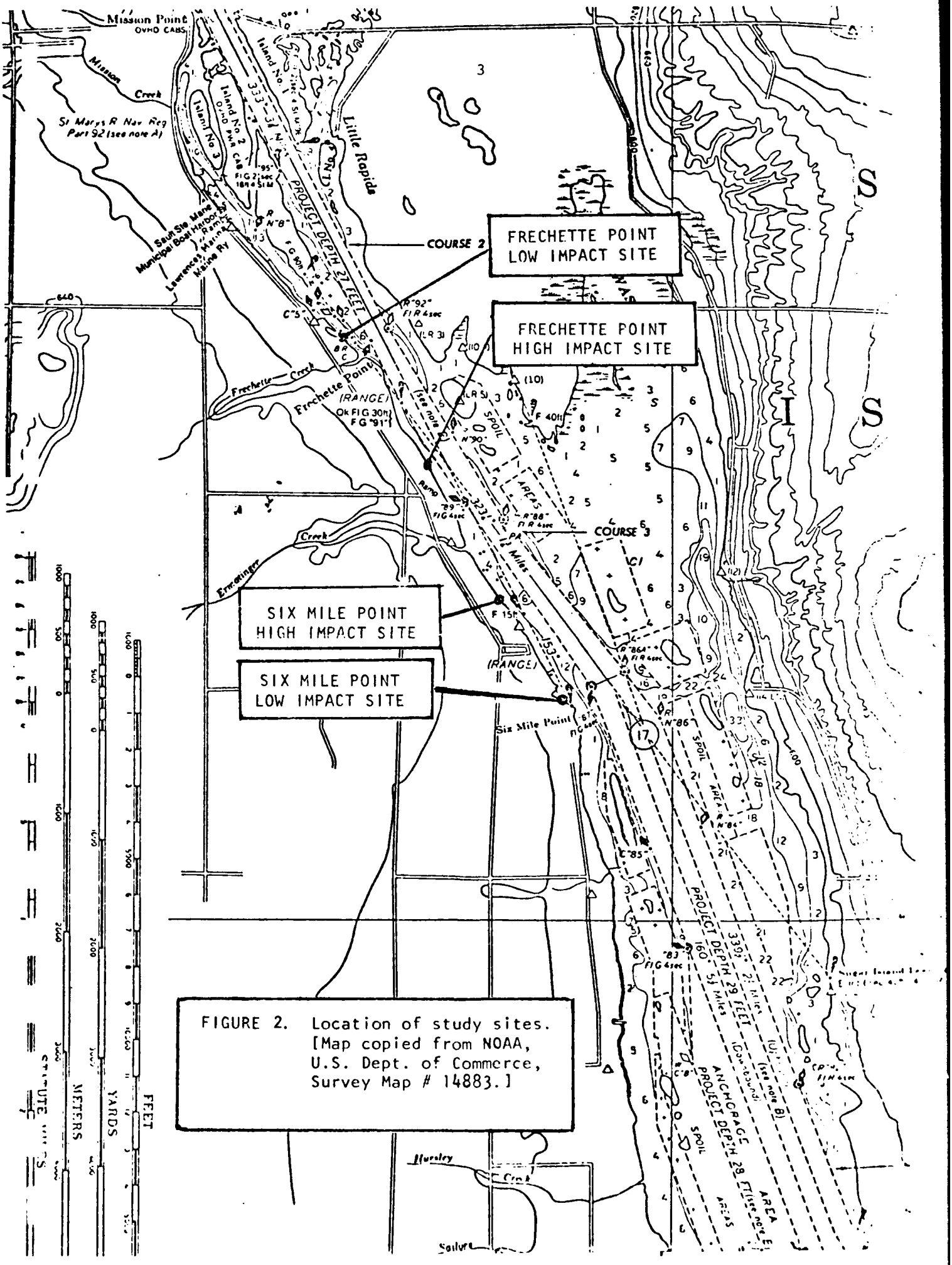

FIGURE 2. Location of study sites. [Map copied from NOAA, U.S. Dept. of Commerce, Survey Map # 14883.]

At each of the two remaining locations we selected two sites for study. One site at a location was selected as a potentially high impact site and the other site as a potentially low impact, (reference or control) site (Figure 2). Selection of the high and low impact sites was based primarily on the relative amount of vessel-induced disturbance of the physical environment observed at the various sites by CRREL and GLFL staff. A total of five sampling stations was established at each site along the 1, 2, and 3 m depth contours (Figure 3).

Benthic macroinvertebrate samples were collected with a Ponar grab at Frechette Point and Six Mile Point. At Frechette Point, three replicate grab samples were taken at each station (1, 2, 3, 4, 6, 7, 8, and 9) at the 1 and 2 m depth contours (Figure 3). At Six Mile Point Point, three replicate grab samples were taken at each station (11-20) at the 1, 2, and 3 m depth contours (Figure 3). Samples were collected once per month, January-April, at all stations listed above, except station 19, which was not sampled in February because ice cover extended to the bottom. All grab samples were washed through a U.S. standard #30 sieve and the residue was preserved in 10% formalin. Samples were taken to GLFL where the macroinvertebrates were extracted, identified, and enumerated. As set forth in the Memorandum of Agreement, only one sample from each three-replicate set was analyzed; the remaining samples were archived and are available if needed. A total of 30 samples was also taken with a Ponar grab at Ninemile Point in January, before it was decided to eliminate that as a sampling location; all of those samples were also archived.

Drift samples were collected with standard cone-shaped plankton nets, 30 cm in diameter with 580 µm mesh. Each net was anchored in the current with a long rod; one end of the rod was driven into the river bottom and the other end extended above the ice surface. The net was fished just above the bottom and was attached to the anchor rod in a manner that allowed the net to swing freely from side to side in response to changes in direction of the current. In February, drift samples were collected at Frechette Point high impact site at four stations (7a, 7b, 7c, and 7d). These stations were located across the 1 m depth contour between stations 7 and 9; they were 57 ft apart and station 7a was 57 ft from station 7. In March and April, drift samples were taken at Frechette Point and Six Mile Point on the 1, 2, and 3 m depth contours at stations 2, 4, 5, 7, 9, 10, 12, 14, 15, 17, 19, and 20. Drift nets were fished 20, 36, and 42 times in February, March, and April respectively for a total of 808 h (average of 8.2 h per set). All material present in each drift net when it was lifted was placed in a sample jar with water and 10% formalin and taken to GLFL for processing and analysis. Each sample was processed by first extracting the macrophytes; the amount of macrophyte material was then quantified by measuring the surface area of each macrophyte fragment with a Li-cor leaf area meter LI-3000.[1/], using a method developed by GLFL (C. Brown, personal communication).

[1/] Use of trade names or manufacturers' names does not imply Government endorsement of any commercial product.

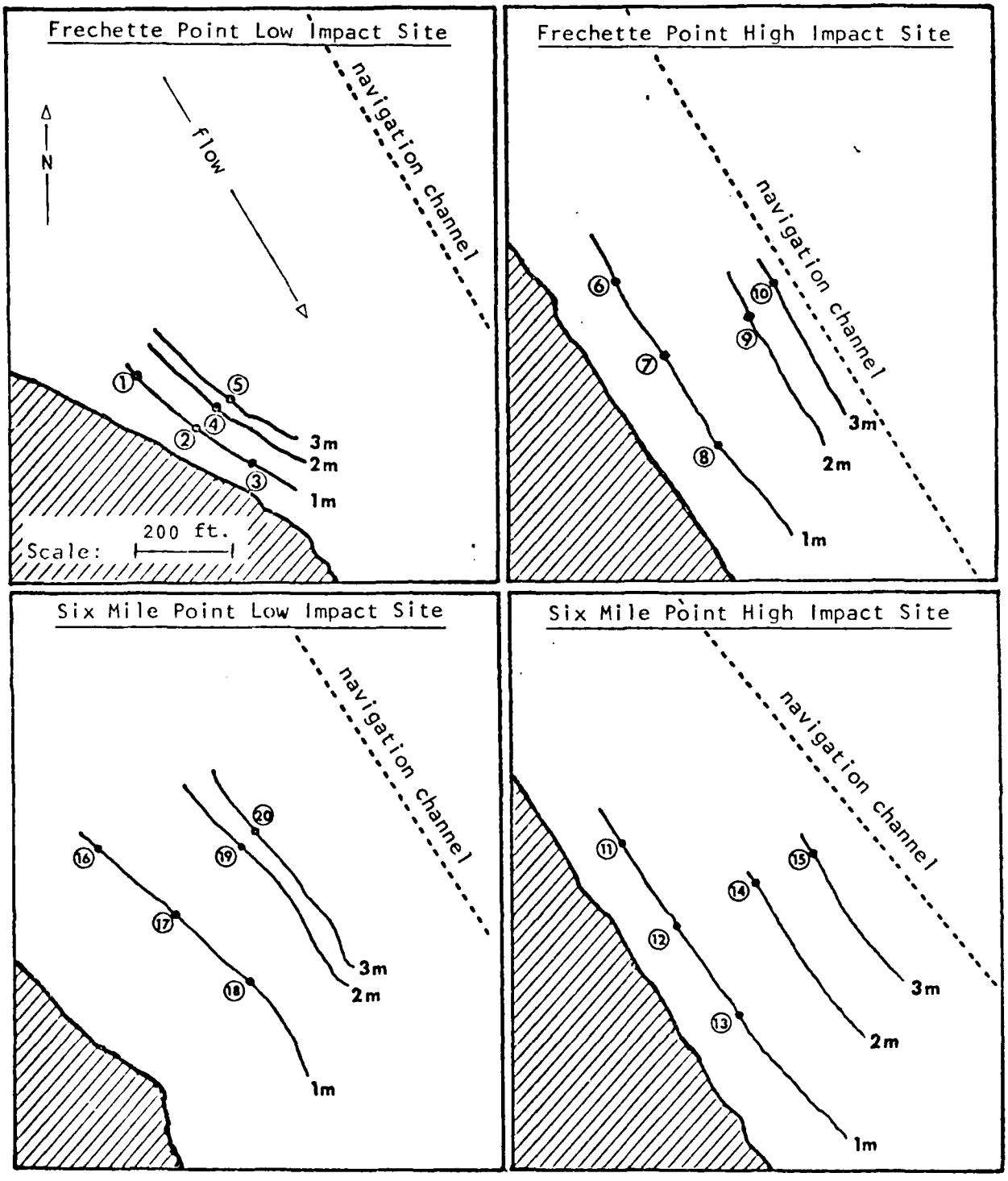

Figure 3. Station locations at Frechette Point and Six Mile Point, January - April 1979.

Macroinvertebrates were then sorted from the samples, identified, and enumerated, using a dissecting microscope. The remaining material in the sample (detritus) was put into suspension by shaking the sample jar, and then decanted onto Whatman #1 filter paper, leaving the heavier inorganic material (sand, etc.) in the jar. The detritus and the filter paper were then dried 4 h at 105°C in a drying oven, and weighed to the nearest milligram on an analytical balance.

Light levels were measured in the water column with a Photomatic Model 1 submersible photometer calibrated in foot-candles. Readings were taken at the surface, middle, and bottom of the water column at stations 2, 4, 5, 7, 9, 10, 12, 14, 15, 17, 19, and 20. A total of 18 light penetration measurements was made in February, 36 in March, and 78 in April.

Sampling for fish was conducted with graded-mesh gillnets (140 ft long and 6 ft high, with 20 ft each of 1, 1-1/2, 2, 2-1/2, 3, 4, and 5 inch mesh, stretched measure), fyke nets (16 ft long x 4 ft diameter pot; 75 ft wings; 1-1/2 inch mesh netting, stretched measure), and small hardware cloth traps (1 ft high x 2 ft wide x 3 ft long covered with 1/4 hardware cloth). Gillnets were set perpendicular to the shoreline on the 2 m depth contour at Six Mile Point (stations 14 and 19) on January 16, and left overnight; strong water currents at Frechette Point prevented us from making similar sets there, on January 16, as planned. When we lifted the gillnets at stations 14 and 19, we found them filled with macrophytes to the point that they could not have fished effectively. Because of the macrophyte clogging problem and the fact that high water velocity prevented their use at Frechette Point, we discontinued the use of gillnets and conducted all subsequent fish sampling with fyke nets and hardware cloth traps. Fyke nets were set overnight at the 2 m depth contour with the wings extending downstream; they were set at stations 9 and 14 in February and at stations 4, 9, 14, and 19 in March and April. A total of two fyke net sets was made in February, seven in March, and eight in April. Hardware cloth traps were set overnight at the 2 m depth contour at station 4; two traps were set in March and two were set again in April. Fish taken from the nets and traps were measured (total length in cm) and returned to the water alive.

RESULTS AND DISCUSSION

BENTHIC MACROINVERTEBRATES

Macroinvertebrates of 56 taxa were identified in 75 Ponar grab samples taken during January-April at Frechette Point and Six Mile Point (Table 1, Appendix 1). The taxonomic composition was quite similar at both locations with minor exceptions; eight taxa (mostly caddisflies, Trichoptera), were collected at Frechette Point but not at Six Mile Point, and five taxa were found at Six Mile Point but not at Frechette Point. The aquatic insects (Diptera, Ephemeroptera,

Table 1. Benthic macroinvertebrates collected by Ponar grab from the St. Marys River at Frechette Point and Six Mile Point, January-April 1979. [F = found only at Frechette Point; S = found only at Six Mile Point.]

- Cnidaria
  - Hydra
- Tricladida
- Rhabdocoela
- Nematoda
- Nemertinea (S)
- Hirudinea
- Oligochaeta
- Polychaeta
  - Manayunkia speciosa
- Copepoda
- Decapoda
  - Orconectes (F)
- Ostracoda
- Amphipoda
  - Gammarus
  - Hyalella azteca
- Isopoda
  - Asellus
  - Lirceus
- Diptera
  - Tipulidae (S)
  - Ceratopogonidae
  - Chironomidae
  - Empididae
  - Simulidae
- Ephemeroptera
  - Ephemerella
  - Baetisca (F)
  - Caenis
  - Ephemera
  - Hexagenia
- Coleoptera
  - Haliplus (S)
  - Dytiscidae (S)
- Lepidoptera
- Neuroptera
  - Sialis (F)
- Trichoptera
  - Mystacides
  - Triaenodes
  - Cheumatopsyche
  - Hydropsyche (F)
  - Neureclipsis (F)
  - Polycentropus
  - Agrypnia
  - Ceraclea (F)
  - Hydroptila
  - Setodes (F)
  - Molanna
  - Oecetis
  - Phylocentropus
  - Psycomyia (F)
- Hemiptera
  - Corixidae (S)
- Acarina
  - Arrenurus
- Gastropoda
  - Amnicola
  - Campeloma
  - Gyraulus
  - Helisoma
  - Lymnaea
  - Physa
  - Valvata sincera
  - V. tricarinata
  - Goniobasis livescens
- Pelecypoda
  - Pisidium
  - Sphaerium

Coleoptera, Lepidoptera, Neuroptera, and Trichoptera) displayed the highest diversity with 29 taxa followed by molluscs (Gastropoda and Pelecypoda) with 11 taxa. The taxonomic composition of the macrobenthic fauna in the study area was very similar to that found in studies conducted in the St. Marys River in 1974-75 (Hiltunen 1978a) and in 1979 (Gleason et al. 1979) and also in the lower St. Clair River in 1977 (Hiltunen 1978b).

In the present study the most abundant organisms were Chronomidae (midge larvae), Oligochaeta (worms), and Gastropoda (snails); collectively they comprised about 67% of the total number of organisms collected (Table 2). Pelecypoda (fingernail clams), Amphipoda (scuds), Polychaeta, Ephemeroptera (mayflies), and Trichoptera (caddisflies) were common in all samples and collectively made up 22% of the total. The same major groups (Chironomidae, Oligochaeta, and Gastropoda) were also found to be numerically dominant in other macroinvertebrate studies on the St. Marys River (Hiltunen 1978a and Gleason 1979) and on the Lower St. Clair River (Hiltunen 1978b); there were, however, two exceptions: (1) gastropods (snails) comprised 45.1% of the total number of benthic macroinvertebrates taken by Gleason (1979) in the St. Marys River, while in the present study gastropods (snails) comprised only 19.7% of the total; and (2) Hiltunen (1978b) found that oligochates (worms) comprised 49.2-62.6% of the total catch in the lower St. Clair River, whereas in the present study they were only 22.5% of the total.

In the present study, average densities of major groups (Table 2) ranged from 129.1/m^2 for Trichoptera (caddisfly larvae) to 3,517.7/m^2 for Chironomidae (midge larvae). These densities were quite similar to densities reported for the same groups for the St. Marys River and the St. Clair River by Hiltunen (1978a, 1978b). The only major exception was that the average density of oligochaetes in the St. Clair River was higher than that found in the present study, probably because the samples on which the St. Clair River study was based were taken in spring and fall when oligochaete densities are normally higher than in winter.

In the present study, the total density of benthic macroinvertebrates (all taxa combined) for all stations and months was 14,125.8/m^2 (Table 2). Total density was quite variable and ranged from 1,894/m^2 in March at Frechette Point high impact site to 25,174/m^2 in February at Six Mile Point low impact site (Table 3). Densities were higher at the low impact sites in most instances. At the Frechette Point low impact site, densities were higher in all months except February and at the Six Mile Point low impact site they were higher in all months except March (Table 3).

Three, one-way analysis of variance tests (ANOVA) were run to determine if there were significant differences in mean density of benthic macroinvertebrates between locations (all months, depths, and

Table 2. Density (average number/m^2) and relative abundance (as percent of total) of the major groups of benthic macroinvertebrates collected by Ponar grab from the St. Marys River, January-April 1979. [All stations and months combined.]

	Average number/m^2	Percent of total
Chironomidae	3,512.7	24.9
Oligochaeta	3,177.5	22.5
Gastropoda	2,786.0	19.7
Pelecypoda	1,485.5	10.5
Polychaeta	973.1	6.9
Amphipoda	478.8	3.4
Ephemeroptera	158.1	1.1
Trichoptera	129.1	0.9
All others	1,425.0	10.1
Total density for all taxa combined	14,125.8	

Table 3. Density (average number/m^2) of benthic macroinvertebrates (all taxa combined) taken by Ponar grab from the St. Marys River, January-April 1979.

Location and site	Month			
	January	February	March	April
Frechette Point				
High impact site	9,824	16,404	2,726	1,894
Low impact site	13,222	8,688	21,621	6,999
Six Mile Point				
High impact site	17,611	9,000	20,032	17,962
Low impact site	21,313	25,174	18,689	18,801

sites were pooled within each location), between the 1 and 2 m depths (all months and sites were pooled within each depth), and among months (all sites and depths pooled within months). These tests were performed on the untransformed raw count data, and because data from benthic macroinvertebrate samples often fit a negative binomial distribution, on the count data transformed (by $Log_{10} + 1$). The results of all tests were the same: no significant differences ($\alpha = 0.05$) were found. A three-way ANOVA was not run because there were too few degrees of freedom to test the interactions between factors.

The results of the above tests suggest that there was no decrease in density of benthic macroinvertebrates due to vessel-related disturbance throughout the course of the study. However, the results of the ANOVAs could also be interpreted to mean that control or reference sites were affected to the same degree as the high impact sites.

Because sample sizes in our study were small, we tested the power of the ANOVAs to detect significant differences that may have been present. Results of a "power of ANOVA" test (Dixon and Massey 1957) indicated that our sample sizes and sample variances would have failed to detect a significant difference (at $\alpha = 0.05$) in mean macroinvertebrate densities between locations 45% of the time; between depths 60% of the time; and between months 70% of the time. Using methods described by Kastenbaum et al. (1970) to determine sample size requirements for one-way ANOVA, we determined we would have needed 62 samples per location, over 200 samples per depth, and 40 samples per month to detect a significant difference (at $\alpha = 0.05$) in means 80% of the time, or to fail to detect a significant difference in means only 20% of the time. We have 150 archived samples collected during the study that could be processed to satisfy the sample size requirements to conclusively demonstrate whether or not significant differences exist between locations and among months; there is, however, an insufficient number of archived samples to permit us to conclusively demonstrate whether significant differences occur between depths.

Thus, a provisional demonstration of the effect of vessel passage on the density of benthic macroinvertebrates at the study sites will require (1) that we analyze additional samples to improve the power of the ANOVAs and (2) that the ANOVAs show a greater decrease in density at the high impact sites. An unequivocal demonstration of effect (or no effect) would also require additional "unaffected baseline" data collected during a winter or series of winters when there was no vessel traffic through the study area.

DRIFT

Drift nets were fished at Frechette Point and Six Mile Point during February 15-April 21, 1979, (Appendix 2). Macroinvertebrates representing 24 taxa were identified in the drift net catches (Table 4). All but four of these taxa (Mysis, Chaoborus, Isonychia, and Paraleptophlebia) were also found in the samples taken with a Ponar grab in the study area during January 16-April 20, 1979. The presence of these four taxa in the drift net catches, but not in the Ponar grab samples is not surprising. Mysis and Chaoborus are epibenthic forms often found in the water column; and, in the nymphal form, Isonychia and Paraleptophlebia are free-ranging (nonburrowing, nonclinging) macroinvertebrates of flowing waters that are also frequently found in the water column. The macrophyte catch in drift nets consisted entirely of green, unrooted fragments of Elodea about 0.5-15 cm long. Detritus taken in the drift nets consisted mostly of small fragments of decaying plant matter of terrestrial and aquatic origin; planktonic microcrustacea present in the catch were not identified and were included in the detritus component of catch. One small sculpin (Cottus sp.) was taken in the drift nets; no fish eggs or other fish were present in the drift net catches.

Examination of the drift net fishing records and the records of vessel passages through the study area during February-April (Appendices 2 and 3) revealed that only in February could an unequivocal demonstration be made of the effects of vessel passage on drift net catch. At all other times, vessel traffic in the study area was too frequent to permit the collection of drift net samples that could serve as an unaffected baseline against which the samples reflecting the effect of vessel passage could be compared.

Drift net fishing effort and catch in February at the Frechette Point high impact site summarized in Table 5 reveals a total of 102 net hours of fishing effort expended from 0900-1700 h on February 15 to 1030 h on February 16 yielded catches of macroinvertebrates of 0-0.24 organisms/h, no macrophytes, and small amounts (0.02-0.04 g/h) of detritus (almost entirely microcrustaceans). Catch rose sharply during 1030-1230 h on February 16 to over 10 macroinvertebrates/h, over 7 cm^2 of macrophyte material, and to 0.24 g/h of detritus (mostly decaying plant matter). Catch rose moderately for macroinvertebrates during 1230-1430 h to 14/h, and sharply for macrophytes and detritus to over 16 cm^2/h and 5.38 g/h respectively. Catch of macroinvertebrates and detritus then declined during 1400-1600 h to about 8 cm^2/h and to 0.28 g/h respectively (about the same levels recorded during 1030-1230 h), while macrophyte catch continued to rise, to over 42 cm^2/h.

Table 4. Macroinvertebrates collected in drift nets fished at Frechette Point and Six Mile Point in the St. Marys River, February 15-April 21, 1979. [[a]=Not found in Ponar grab sample.]

Cnidaria	Ephemeroptera
Hydra	*Ephemera*
	Hexagenia
Hirudinea	*Isonychia*[a]
	Baetisca
Oligochaeta	*Caenis*
	Paraleptophlebia[a]
Amphipoda	
Gammarus	Trichoptera
	Mystacides
Isopoda	*Agrypnia*
Lirceus	
	Hemiptera
Mysidacea	Corixidae
Mysis relicta[a]	
	Acarina
Diptera	Gastropoda
Chaoborus[a]	*Amnicola*
Chrionomidae	*Campeloma*
Simulidae	*Gyraulus*
	Physa
	Valvata sincera

Table 5. Drift net fishing effort and catch at Frechette Point high impact site (station 7), February 15-16, 1979. [Each catch is an average value representing samples collected in four nets fished simultaneously on the 1 m depth contour.]

Effort and catch	Dates and hours nets fished				
	Feb. 15	Feb. 15-16	Feb. 16		
	0900-1700	1700-1030	1030-1230	1230-1400	1400-1600
Effort (number of net-hours fished)	32	70	8	6	8
Catch (per net-hour)					
Macroinvertebrates (number)	0	0.2	10.9	14.0	8.4
Macrophytes (cm^2 plant surface area)	0	0	7.33	26.67	42.23
Detritus (g)	0.02	0.04	0.24	5.38	0.28

Information on vessel movement through the study area obtained from the U.S. Coast Guard (Appendix 3), Alger (1979), Gleason et al. (1979), and on-site observations by GLFL staff collectively revealed the following: no vessels passed the study site on February 13-15; the U.S. Coast Guard cutter, Mackinaw, passed the Frechette Point high impact site on February 16, downbound at 1015 h, and passed again, upbound at about 1030 h, followed by the P.R. Clarke at 1250 h, the C.J. Callaway at 1304 h, and the J.C. Munson at 1328 h. Apparently the low catches in drift nets lifted at 1700 h on February 15 and at 1030 h on February 16 can be taken as the unaffected baseline condition, because no vessels passed the site during February 13 and 14 (no earlier records of vessel passage in February were examined), or on February 15. The Mackinaw passed the site downbound at 1015 h and, although its passage could have been expected to have increased the catch in the nets lifted at 1030 h, the data of Table 5 indicates it did so only minimally, if at all.

On its return trip upbound past the study site at 1030 h, however, the Mackinaw seems to have caused a large increase in catch of all of the components of drift in samples covering the period 1130-1230 h. An entirely satisfactory explanation for this difference in catch resulting from the downbound and upbound passages cannot be made with the available data. No records of vertical ice displacement (a measurement of under-ice disturbance that could have increased drift catches) were made during the Mackinaw's downbound passage. Gleason et al. (1979) provide a record for the upbound passage of the Mackinaw at 1030 h which indicates that the maximum vertical ice displacement was small (11.2 cm) relative to those caused by the three vessels that passed upbound at 1250-1328 h (60-64 cm). The results of Alger's (1979) study reveal that a vessel moving downstream at a given speed will cause considerably less vertical ice displacement and vertical sediment suspension than the same vessel passing upstream at the same speed; however, application of this generalization is confounded by the fact that the Mackinaw was backing upstream when it passed the study site at 1030 h. Nevertheless, the large increase in catch in the drift nets during 1030-1230 h on February 16 can be attributed to the disturbance (changes in current velocity and direction and the vertical displacement of ice and bottom sediments as described by Alger 1979, and Gleason et al. 1979) caused by the Mackinaw passing the study site and also to the disturbance caused upstream from the study site by the continued upbound passage of the Mackinaw. The large catches in drift nets lifted at 1400 h can be attributed to the passage of the P.R. Clarke, the C.J. Callaway, and the J.C. Munson at 1250, 1304, and 1328 h, respectively, and to the disturbance caused upstream of the study site by the continued upbound passage of those vessels and the Mackinaw. No vessels passed the study site during 1400-1600 h on February 16 and the relatively high catches during that period reflect only the disturbances caused at the site by the earlier passage of vessels during 1030-1328 h and the continuing disturbances upstream caused by their upbound passage.

The increase in catch of macrophytes during 1400-1600 h (over that during 1230-1400 h) while catches of macroinvertebrates and detritus decreased can be explained in part on the basis of the buoyancy of these three components of the drift net catch. Our observations of the macrophyte fragments in the water-filled sample jars revealed that these fragments were relatively buoyant, suggesting that those fragments dislodged from deposits in low current areas or broken from rooted stems by vessel-caused disturbance would remain in the water column long enough to be transported considerable distances downstream by under-ice river currents. The buoyancy of the macroinvertebrates and detritus in the sample jars was low compared to that of the macrophytes suggesting that the catch of macroinvertebrates and detritus during 1400-1600 h should indeed have decreased faster than that of the macrophytes. Bottom-seeking responses of benthic macroinvertebrates would also reduce their presence in the water column and their vulnerability to capture in the drift nets more quickly than would the passive sinking of the macrophytes and perhaps even the detritus.

Thus, the high drift catches shown in Table 5 during 1030-1600 h on February 16 can clearly be attributed to physical disturbances of the benthic and epibenthic habitat caused by vessels passing the study site.

Comparison of the average catches in drift nets for Frechette Point and Six Mile Point and for the high and low impact sites during March and April (only the Frechette high impact site was sampled in February) revealed differences which are difficult to interpret unequivocally, but which suggest areas which may require additional study. Moderately large differences were evident between the catches of macroinvertebrates at Frechette Point and Six Mile Point. Unweighted average catches based on pooled values from Table 6 for high and low impact sites for March and April at each location, and calculated as follows, showed the macroinvertebrate catch at Frechette Point (0.18 organisms/h) was about twice as large as that at Six Mile Point (0.09/h):

$$\text{Frechette Point:} \quad \frac{0.04 + 0.44 + 0.01 + 0.21}{4} = 0.18$$

$$\text{Six Mile Point:} \quad \frac{0.01 + 0.09 + 0 + 0.25}{4} = 0.09$$

Similar calculations revealed the macrophyte component of catch at the Frechette Point location (1.55 cm^2/h) was about half that at Six Mile Point (3.11 cm^2/h) and that the detritus component of catch at Frechette Point (0.23 g/h) was slightly less than twice that at Six Mile Point (0.14 g/h). Catches in drift nets at high impact sites also differed markedly from those at the low impact sites. Unweighted average catches based on pooled values from Table 6 for the two

Table 6. Drift net catches, March 13-April 21, 1979.

Sampling period	Location and site	Average catch per hour		
		Macro-invertebrates (number)	Macrophytes (cm^2)	Detritus (g)
March 13-18	Frechette Point			
	High impact	0.04	5.12	0.25
	Low impact	0.44	0.58	0.06
	Six Mile Point			
	High impact	0.01	3.46	0.01
	Low impact	0.09	1.14	0.05
April 20-21	Frechette Point			
	High impact	0.01	0.13	0.26
	Low impact	0.21	0.36	0.36
	Six Mile Point			
	High impact	0	6.97	0.47
	Low impact	0.25	0.88	0.04

locations for March and April showed the macroinvertebrate catch at the high impact sites (0.02 organisms/h) was about 1/10 that at the low impact sites (0.23 organisms/h); macrophyte catch at the high impact site (3.92 cm^2/h) was about 5 times that at the low impact site (0.74 ^{2}/h); and detritus catch at the high impact site (0.25 g/h) was about twice that at the low impact site (0.13 g/h).

Because benthic macroinvertebrates transported into the water column by vessel-induced disturbance would (for the reasons mentioned earlier) tend to settle to the bottom relatively quickly where they would not be susceptible to capture in drift nets, the observed differences in catch of benthic macroinvertebrates in drift nets at the various locations and sites could be expected to be positively correlated with their densities in the bottom populations in the immediate vicinity. The higher catch of macroinvertebrates in drift nets at the low impact sites than at the high impact sites during March-April is consistent with the higher densities of macroinvertebrates in the bottom populations at the low impact sites than at the high impact sites as shown by the Ponar grab samples of Table 3 for March-April; the unweighted average densities calculated from Table 3 for March-April are 15,027/m^2 for the low impact sites and 10,653/m^2 for the high impact sites. A similar correlation was expected between drift net catch and Ponar grab samples at Frechette Point and Six Mile Point, but was not found; the densities calculated from Table 3 were 8,310/m^2 and 18,871/m^2 respectively for the two locations. The available data do not permit explanation of these inconsistent results.

The almost complete absence of information on the source populations of the two other major components of catch in the drift nets prevents interpretation beyond that given above for the February 15-16 catches; the locations of stands of macrophytes and deposits of detritus in and upstream of the study area are not known and could not be readily determined during the period of ice cover when this study was conducted.

Comparison of the drift net catches in March with those in April permit an examination of the effect on drift of vessel passage during and after the period of solid ice cover. Catches in drift nets in March differed little from those in April. The unweighted average catches of macroinvertebrates in March and April, based on pooled values from Table 6 for all locations and sites by month calculated as follows were virtually identical:

$$\text{March:} \quad \frac{0.04 + 0.44 + 0.01 + 0.09}{4} = 0.15$$

$$\text{April:} \quad \frac{0.01 + 0.21 + 0 + 0.25}{4} = 0.12$$

Unweighted average catches of macrophytes in March and April were also similar (2.57 and 2.08 cm^2/h, respectively), and the detritus catch in March (0.20 g/h) was almost identical to that in April (0.18 g/h).

In one respect, the lack of an apparent difference between drift catches in March and April (Table 6) is not surprising. Although the solid ice cover present in March broke up (apparently in response to icebreaker activity and heavy vessel traffic, rather than ice-melt and heavy runoff) just before sampling was conducted in April, the limnological conditions that prevailed on March 13-18 and could have influenced drift catch probably differed little from those on April 20-21. Water temperature changed little during March and April, because the river had solid ice cover in March and a heavy cover of floe ice in April. River discharge (flow) was also closely similar in both months; average discharge from Lake Superior was 1903 m^3/s in March and 1893 m^3/s in April (Alger 1979). Perhaps what is surprising is that the catch in March is so similar to that in April despite the heavier vessel traffic that occurred during the April sampling period (Appendix 3). A total of eight vessels passed through the study area on March 11-18, four of these during March 13-14 and 17-18, while drift nets were being fished (Appendices 2 and 3). In contrast, a total of 30 vessels passed through the study area on April 19-21; 22 of these passed on April 20-21, while drift nets were being fished.

The lack of larger catches in the drift nets in April when vessel traffic was considerably heavier suggests that the effect on drift net catch of vessel passage through the study area was greater when there was solid ice cover than when there was only floe ice cover.

The significance of the observed vessel-induced drift cannot be demonstrated with the available data. However, the biota and detritus represented in our drift net catches may constitute an energy resource that is important to production in the portion of the St. Marys River covered by our study. The accelerated transport of this material through the system in winter, when production probably reaches the annual minimum, may therefore result in a considerable net energy loss to that portion of the system from which the material is transported.

TURBIDITY

Light levels were measured at the surface, middle, and bottom of the water column to determine if vessel passage increased turbidity, as shown by a decrease in light penetration. Because light penetration varied unpredictably (apparently as a result of differences in ice thickness and condition) we calculated light penetration as follows, using the light measurements at the middle and bottom of the water column:

$$\frac{\text{ft-candles at bottom}}{\text{ft-candles at middle}} \times 100 = \% \text{ of light reaching bottom from middle}$$

The results indicate that light penetration at stations on the 1 m depth contour was generally lower in February than in March or April (Table 7). One exception occurred in February at station 7a at 1330-1340 when 37.5% of the light that reached the middle of the water column also reached the bottom. We also observed that light penetration in March and April was greater at the low impact sites (Table 7). The same trends observed at the stations on the 1 m depth contour also occurred at the stations on the 2 and 3 m depth contours.

Vessel passage occurred either during or just prior to all light level measurements except those taken in March (Appendices 3 and 4); therefore, we used March data as the unaffected baseline from which to measure the effects of vessel passage. With the exception of one measurement at station 7a in February, light penetration was lower in February than in March (Table 7), indicating vessel passage may have caused the decrease in light penetration observed in February. Light penetration was greater in April than in March in several instances (Table 7) in spite of heavier vessel traffic in April (Appendix 3). The breakup of solid ice cover in April may have reduced the vessel-induced disturbance of bottom sediments and permitted greater light penetration despite heavier vessel traffic.

The available data suggest that vessel passage caused decreases in light penetration (an increase in turbidity) under ice cover and that the greater decreases were caused at the high impact sites. Additional unaffected baseline data are needed for a conclusive demonstration of the effects of vessel passage on light penetration under ice cover in the study area.

FISH

A total of 73 fish representing seven species was caught by all gear during February-April (Table 8; Appendix 5). White suckers dominated the catch (76.7%), followed by burbot and sculpin (each at 6.8%); other species included yellow perch, lake herring, northern pike, longnose sucker, and ninespine stickleback. Gillnets fished twice in February caught one white sucker, and hardware cloth traps fished twice in March and twice in April caught a total of five sculpins and one ninespine stickleback. Fyke nets caught 6 white suckers (average of 3 fish/net night) in February; 11 white suckers and 1 burbot (average of 1.7 fish/ net night) in March; and 38 white suckers, 4 burbot, 2 lake herring, 2 yellow perch, 1 longnose sucker, and 1 northern pike (average of 6 fish/net night) in April. The lower fish catch in February and March indicates few fish were in the study area or that the fish in the area moved little at that time. The higher catch in April may have been due to ice breakup and early spawning-related movements in the study area.

Too few fish were collected to determine if vessel passage affected fish distribution or abundance in the study area; none of the fish we collected exhibited any anatomical anomalies that we could

Table 7. Percent light penetration from the middle to bottom depths at 1 m (depth) stations [under ice cover] in the St. Marys River, February 16-April 21, 1979.

Site	Station	Date and time of measurement						
		2/16	2/16	3/18	4/21	4/21	4/21	4/21
Frechette Point High Impact Site		1310-1320	1330-1340	1445				
	7a	15.7	37.5					
	7c	14.5	21.6					
	7d	17.5	20.2					
	7			35.3				
Frechette Point Low Impact Site				1500	1100	1300	1500	1700
	2			46.4	73.1	59.2	50.0	53.8
Six Mile Point High Impact Site				1415	1600	1800		
	12			25.6	14.7	20.5		
Six Mile Point Low Impact Site				1400	1630	1830		
	17			33.3	22.6	75.0		

Table 8. Total number and relative abundance (expressed as percent of total) of all species of fish collected by all gear at Frechette Point and Six Mile Point, January 16-April 21, 1979.

Common name	Scientific name	Number	Percent of total
White sucker	Catostomus commersoni	56	76.8
Burbot	Lota lota	5	6.8
Sculpin	Cottus sp.	5	6.8
Yellow perch	Perca flavescens	2	2.7
Lake herring	Coregonus artedii	2	2.7
Northern pike	Esox lucius	1	1.4
Longnose sucker	Catostomus catostomus	1	1.4
Ninespine stickleback	Pungitius pungitius	1	1.4
	Total catch	73	100.0

attribute to the effects of vessel passage. The burbot was the only winter-spawning fish that we collected in the study area, and we have no evidence that they spawned in the study area; as mentioned above, no fish eggs of any kind were collected in the drift nets.

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Appendix 1. Estimates of benthic macroinvertebrate density from Ponar grab samples taken at Frechette Point and Six Mile Point in the St. Marys River, January 16-April 20, 1979.

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
7/20/79	1.0	CNIDARIA		
		HYDRA	96	1983
		ALL CNIDARIA		1983
		NEMATODA	13	269
		HIRUDINEA	7	145
		OLIGOCHAETA	456	9421
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	113	2335
		ALL POLYCHAETA		2335
		AMPHIPODA		
		HYALELLA	33	682
		ALL AMPHIPODA		682
		ISOPODA		
		ASELLUS	15	
		LIRCEUS	2	
		ALL ISOPODA		351
		DIPTERA		
		CERATOPOGONIDAE	8	
		CHIRONOMIDAE	231	4772
		EMPIDIDAE	5	
		ALL DIPTERA		5041
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		62
		LEPIDOPTERA	2	41
		TRICHOPTERA		
		MYSTACIDES	1	
		NEURECLIPSIS	2	
		POLYCENTROPUS	4	
		ALL TRICHOPTERA		145
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	102	
		GYRAULUS	14	
		HELISOMA	3	
		PHYSA	2	
		VALVATA SINCERA	4	
		VALVATA TRICARINATA	24	
		ALL GASTROPODA		3078
		PELECYPODA		
		PISIDIUM	10	207
		ALL PELECYPODA		207

MACROBENTHOS OF THE ST. MARYS RIVER STATION 02

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/20/79	1.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		NEMATODA	9	186
		HIRUDINEA	1	21
		OLIGOCHAETA	89	1839
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	11	227
		ALL POLYCHAETA		227
		OSTRACODA	2	41
		AMPHIPODA		
		GAMMARUS	2	41
		ALL AMPHIPODA		41
		ISOPODA		
		ASELLUS	3	
		LIRCEUS	1	
		ALL ISOPODA		83
		DIPTERA		
		CERATOPOGONIDAE	1	
		CHIRONOMIDAE	75	1549
		EMPIDIDAE	6	
		ALL DIPTERA		1735
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	3	
		ALL EPHEMEROPTERA		83
		TRICHOPTERA		
		HYDROPSYCHIDAE	1	21
		ALL TRICHOPTERA		21
		ACARINA	3	62
		GASTROPODA		
		AMNICOLA	23	
		GYRAULUS	1	
		LYMNAEA	1	
		VALVATA SINCERA	63	
		VALVATA TRICARINATA	6	
		ALL GASTROPODA		1983
		PELECYPODA		
		PISIDIUM	23	475
		ALL PELECYPODA		475

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 03

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/20/79	1.0	RHABDOCOELA	1	21
		OLIGOCHAETA	39	806
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	2	41
		ALL POLYCHAETA		41
		AMPHIPODA		
		HYALELLA	2	41
		ALL AMPHIPODA		41
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	42	868
		ALL DIPTERA		909
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		41
		TRICHOPTERA		
		PSYCHOMYIA	1	21
		ALL TRICHOPTERA		21
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	19	
		GYRAULUS	2	
		LYMNAEA	2	
		VALVATA SINCERA	5	
		VALVATA TRICARINATA	19	
		ALL GASTROPODA		971
		PELECYPODA		
		PISIDIUM	13	269
		ALL PELECYPODA		269

ALL	DEPTH(M.)	TAXA	--GRAB COUNTS--	STATION 64 MEAN NO./M²
1/20/79	2.0	CNIDARIA		
		HYDRA	399	8243
		ALL CNIDARIA		8243
		RHABDOCOELA	1	21
		NEMATODA	4	83
		HIRUDINEA	1	21
		OLIGOCHAETA	111	2293
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	2	41
		ALL POLYCHAETA		41
		OSTRACODA	2	41
		AMPHIPODA		
		HYALELLA	15	310
		ALL AMPHIPODA		310
		ISOPODA		
		ASELLUS	2	
		LIRCEUS	10	
		ALL ISOPODA		248
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	170	3512
		EMPIDIDAE	8	
		SIMULIIDAE	4	
		ALL DIPTERA		3801
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	3	
		ALL EPHEMEROPTERA		83
		TRICHOPTERA		
		AGRYPNIA	1	
		CERACLEA	1	
		CHEUMATOPSYCHE	2	
		HYDROPSYCHE	1	
		MYSTACIDES	1	
		NEURECLIPSIS	2	
		POLYCENTROPUS	3	
		ALL TRICHOPTERA		227
		ACARINA	3	62
		GASTROPODA		
		AMNICOLA	54	
		CONCENTRASIS LIVESCENS	1	
		GYRAULUS	6	
		HELISOMA	8	
		LYMNAEA	1	
		PHYSA	11	
		VALVATA SINCERA	47	
		VALVATA TRICARINATA	6	
		ALL GASTROPODA		2768
		PELECYPODA		
		PISIDIUM	44	909
		ALL PELECYPODA		909

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 06

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/20/79	1.0	NEMATODA	7	145
		HIRUDINEA	2	41
		OLIGOCHAETA	59	1219
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	16	331
		ALL POLYCHAETA		331
		OSTRACODA	2	41
		AMPHIPODA		
		GAMMARUS	4	
		HYALELLA	2	
		ALL AMPHIPODA		124
		ISOPODA		
		LIRCEUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	145	2996
		EMPIDIDAE	2	
		ALL DIPTERA		3078
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	4	
		ALL EPHEMEROPTERA		83
		TRICHOPTERA		
		HYDROPSYCHIDAE	1	
		MYSTACIDES	1	
		POLYCENTROPUS	1	
		ALL TRICHOPTERA		62
		ACARINA	2	41
		GASTROPODA		
		AMNICOLA	16	
		GYRAULUS	15	
		LYMNAEA	1	
		VALVATA SINCERA	25	
		VALVATA TRICARINATA	42	
		ALL GASTROPODA		2045
		PELECYPODA		
		PISIDIUM	11	
		SPHAERIUM	1	
		ALL PELECYPODA		248

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 07

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/20/79	1.0	CNIDARIA		
		HYDRA	9	186
		ALL CNIDARIA		186
		NEMATODA	14	289
		HIRUDINEA	1	21
		OLIGOCHAETA	51	1054
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	16	331
		ALL POLYCHAETA		331
		AMPHIPODA		
		GAMMARUS	2	
		HYALELLA	12	
		ALL AMPHIPODA		289
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	230	4752
		ALL DIPTERA		4793
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	2	
		ALL EPHEMEROPTERA		83
		TRICHOPTERA		
		HYDROPTILIDAE	2	
		MYSTACIDES	2	
		ALL TRICHOPTERA		83
		ACARINA	6	124
		GASTROPODA		
		AMNICOLA	46	
		GYRAULUS	24	
		PHYSA	4	
		VALVATA SINCERA	46	
		VALVATA TRICARINATA	145	
		ALL GASTROPODA		5475
		PELECYPODA	28	578
		PISIDIUM		578
		ALL PELECYPODA		

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 08

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/20/79	1.0	CNIDARIA		
		HYDRA	6	124
		ALL CNIDARIA		124
		NEMATODA	8	165
		OLIGOCHAETA	1	1591
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	47	971
		ALL POLYCHAETA		971
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	1	
		ALL AMPHIPODA		41
		DIPTERA		
		CERATOPOGONIDAE	1	
		CHIRONOMIDAE	95	1963
		ALL DIPTERA		1983
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		ALL EPHEMEROPTERA		62
		TRICHOPTERA		
		NEURECLIPSIS	1	21
		ALL TRICHOPTERA		21
		NEUROPTERA		
		SIALIS	1	21
		ALL NEUROPTERA		21
		ACARINA	4	83
		GASTROPODA		
		AMNICOLA	35	
		GYRAULUS	3	
		VALVATA SINCERA	11	
		VALVATA TRICARINATA	17	
		ALL GASTROPODA		1364
		PELECYPODA		
		PISIDIUM	13	269
		ALL PELECYPODA		269

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 09

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/20/79	2.0	CNIDARIA		
		HYDRA	33	682
		ALL CNIDARIA		682
		NEMATODA	4	83
		HIRUDINEA	10	207
		OLIGOCHAETA	89	1839
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	1	
		ALL AMPHIPODA		41
		ISOPODA		
		ASELLUS	2	41
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	5	
		CHIRONOMIDAE	219	4525
		ALL DIPTERA		4628
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	6	
		ALL EPHEMEROPTERA		145
		LEPIDOPTERA	2	41
		TRICHOPTERA		
		HYDROPTILIDAE	1	21
		ALL TRICHOPTERA		21
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	47	
		GYRAULUS	22	
		HELISOMA	21	
		PHYSA	1	
		VALVATA SINCERA	59	
		VALVATA TRICARINATA	98	
		ALL GASTROPODA		4938
		PELECYPODA		
		PISIDIUM	34	702
		ALL PELECYPODA		702

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 11

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/16/79	1.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		RHABDOCOELA	3	62
		NEMATODA	110	2273
		OLIGOCHAETA	326	6735
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	101	2087
		ALL POLYCHAETA		2087
		AMPHIPODA		
		GAMMARUS	3	
		HYALELLA AZTECA	13	
		ALL AMPHIPODA		331
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	3	
		ALL ISOPODA		83
		DIPTERA		
		CERATOPOGONIDAE	12	
		CHIRONOMIDAE	52	1074
		EMPIDIDAE	1	
		ALL DIPTERA		1343
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	6	
		HEXAGENIA	10	
		ALL EPHEMEROPTERA		351
		TRICHOPTERA		
		MYSTACIDES	1	
		POLYCENTROPUS	1	
		ALL TRICHOPTERA		41
		ACARINA	7	145
		GASTROPODA		
		AMNICOLA	33	
		GYRAULUS	4	
		HELISOMA	3	
		LYMNAEA	2	
		VALVATA SINCERA	37	
		VALVATA TRICARINATA	19	
		ALL GASTROPODA		2025
		PELECYPODA		
		PISIDIUM	47	866
		ALL PELECYPODA		866

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/16/79	1.0	CNIDARIA		
		HYDRA	2	41
		ALL CNIDARIA		41
		RHABDOCOELA	2	41
		NEMATODA	182	3760
		HIRUDINEA	4	83
		OLIGOCHAETA	1	7056
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	444	9173
		ALL POLYCHAETA		9173
		OSTRACODA	3	62
		AMPHIPODA		
		GAMMARUS	2	
		HYALELLA	10	
		ALL AMPHIPODA		248
		ISOPODA		
		ASELLUS	8	165
		ALL ISOPODA		165
		DIPTERA		
		CERATOPOGONIDAE	5	
		CHIRONOMIDAE	95	1963
		ALL DIPTERA		2066
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	4	
		HEXAGENIA	9	
		ALL EPHEMEROPTERA		289
		COLEOPTERA		
		HALIPLIDAE	1	21
		ALL COLEOPTERA		21
		TRICHOPTERA		
		HYDROPTILIDAE	1	
		MYSTACIDES	8	
		OECETIS	1	
		POLYCENTROPUS	2	
		ALL TRICHOPTERA		240
		ACARINA	6	124
		GASTROPODA		
		AMNICOLA	67	
		GYRAULUS	7	
		HELISOMA	2	
		PHYSA	3	
		VALVATA SINCERA	62	
		VALVATA TRICARINATA	79	
		ALL GASTROPODA		4545
		PELECYPODA		
		PISIDIUM	57	1178
		ALL PELECYPODA		1178

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 13

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/16/79	1.0	CNIDARIA		
		HYDRA	2	41
		ALL CNIDARIA		41
		RHABDOCOELA	4	83
		NEMATODA	32	661
		HIRUDINEA	2	41
		OLIGOCHAETA	107	2231
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	132	2727
		ALL POLYCHAETA		2727
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA	4	
		ALL AMPHIPODA		103
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	135	2789
		EMPIDIDAE	2	
		ALL DIPTERA		2872
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		62
		TRICHOPTERA		
		MOLANNA	1	
		MYSTACIDES	5	
		OECETIS	4	
		ALL TRICHOPTERA		207
		ACARINA	4	83
		GASTROPODA		
		AMNICOLA	28	
		GYRAULUS	6	
		HELISOMA	2	
		PHYSA	1	
		VALVATA SINCERA	2	
		VALVATA TRICARINATA	48	
		ALL GASTROPODA		1797
		PELECYPODA		
		PISIDIUM	23	475
		ALL PELECYPODA		475

DATE	DEPTH(M.)	TAXA	--GRAB COUNTS--	MEAN NO./M²
1/17/79	2.0	CNIDARIA		
		HYDRA	16	331
		ALL CNIDARIA		331
		RHABDOCOELA	4	83
		TRICLADIDA	1	21
		NEMATODA	17	351
		HIRUDINEA	2	41
		OLIGOCHAETA	302	6239
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	6	124
		ALL POLYCHAETA		124
		OSTRACODA	20	413
		AMPHIPODA		
		GAMMARUS	6	
		HYALELLA AZTECA	53	
		ALL AMPHIPODA		1219
		ISOPODA		
		ASELLUS	8	
		LIRCEUS	3	
		ALL ISOPODA		227
		DIPTERA		
		CERATOPOGONIDAE	11	
		CHIRONOMIDAE	187	3863
		EMPIDIDAE	2	
		ALL DIPTERA		4132
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	14	
		ALL EPHEMEROPTERA		289
		COLEOPTERA	1	21
		TRICHOPTERA		
		AGRYPNIA	1	
		MYSTACIDES	1	
		ALL TRICHOPTERA		41
		ACARINA	9	186
		GASTROPODA		
		AMNICOLA	75	
		GONIOBASIS LIVESCENS	1	
		GYRAULUS	43	
		HELISOMA	1	
		PHYSA	5	
		VALVATA SINCERA	105	
		VALVATA TRICARINATA	17	
		ALL GASTROPODA		5103
		PELECYPODA		
		PISIDIUM	173	3574
		ALL PELECYPODA		3574

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 15

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/17/79	3.0	CNIDARIA		
		HYDRA	35	723
		ALL CNIDARIA		723
		RHABDOCOELA	3	62
		NEMATODA	30	620
		OLIGOCHAETA	1	5227
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	15	310
		ALL POLYCHAETA		310
		OSTRACODA	2	41
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA	1	
		ALL AMPHIPODA		41
		DIPTERA		
		CERATOPOGONIDAE	15	
		CHIRONOMIDAE	162	3347
		EMPIDIDAE	1	
		ALL DIPTERA		3677
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	32	
		ALL EPHEMEROPTERA		723
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		OECETIS	1	21
		ALL TRICHOPTERA		21
		ACARINA	8	165
		GASTROPODA		
		ANCYLA	32	
		GYRAULUS	3	
		HELISOMA	5	
		VALVATA SINCERA	53	
		VALVATA TRICARINATA	4	
		ALL GASTROPODA		2904
		PELECYPODA		
		PISIDIUM	108	2231
		ALL PELECYPODA		2231

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 16

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/16/79	1.0	CNIDARIA		
		HYDRA	3	62
		ALL CNIDARIA		62
		RHABDOCOELA	5	103
		TRICLADIDA	8	165
		NEMATODA	43	888
		HIRUDINEA	2	41
		OLIGOCHAETA	414	8553
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	35	723
		ALL POLYCHAETA		723
		OSTRACODA	4	83
		AMPHIPODA		
		HYALELLA AZTECA	110	2273
		ALL AMPHIPODA		2273
		ISOPODA		
		ASELLUS	25	
		LIRCEUS	10	
		ALL ISOPODA		723
		DIPTERA		
		CERATOPOGONIDAE	30	
		CHIRONOMIDAE	591	12210
		EMPIDIDAE	3	
		ALL DIPTERA		12892
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	2	
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	4	
		ALL EPHEMEROPTERA		145
		COLEOPTERA		
		DYTISCIDAE	1	21
		ALL COLEOPTERA		21
		LEPIDOPTERA	18	372
		TRICHOPTERA		
		MYSTACIDES	16	
		PHYLOCENTROPUS	1	
		POLYCENTROPUS	11	
		ALL TRICHOPTERA		578
		ACARINA	6	124
		GASTROPODA		
		AMNICOLA	46	
		GYRAULUS	31	
		LYMNAEA	1	
		PHYSA	2	
		VALVATA SINCERA	33	
		VALVATA TRICARINATA	5	
		ALL GASTROPODA		2439
		PELECYPODA		
		PISIDIUM	175	3615
		ALL PELECYPODA		3615

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./
1/16/79	1.0	CNIDARIA		
		HYDRA	2	41
		ALL CNIDARIA		41
		RHABDOCOELA	2	41
		NEMATODA	11	227
		HIRUDINEA	1	21
		OLIGOCHAETA	204	4215
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	3	62
		ALL POLYCHAETA		62
		AMPHIPODA		
		GAMMARUS	5	
		HYALELLA	95	
		ALL AMPHIPODA		2066
		ISOPODA		
		ASELLUS	3	
		LIRCEUS	1	
		ALL ISOPODA		83
		DIPTERA		
		CERATOPOGONIDAE	48	
		CHIRONOMIDAE	520	10743
		EMPIDIDAE	6	
		TIPULIDAE	1	
		ALL DIPTERA		11879
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	3	
		EPHEMERIDAE		
		EPHEMERA	12	
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		331
		COLEOPTERA		
		DYTISCIDAE	1	21
		ALL COLEOPTERA		21
		LEPIDOPTERA	3	62
		TRICHOPTERA		
		MYSTACIDES	2	
		POLYCENTROPUS	1	
		ALL TRICHOPTERA		62
		ACARINA	18	372
		GASTROPODA		
		AMNICOLA	46	
		GYRAULUS	79	
		PHYSA	3	
		VALVATA SINCERA	2	
		VALVATA TRICARINATA	4	
		ALL GASTROPODA		2768
		PELECYPODA		
		PISIDIUM	393	8119
		ALL PELECYPODA		8119

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 18

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/17/79	1.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		RHABDOCOELA	5	103
		NEMATODA	58	1198
		HIRUDINEA	5	103
		OLIGOCHAETA	224	4628
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	65	1343
		ALL POLYCHAETA		1343
		AMPHIPODA		
		HYALELLA AZTECA	99	2045
		ALL AMPHIPODA		2045
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	1	
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	12	
		CHIRONOMIDAE	127	2624
		EMPIDIDAE	2	
		ALL DIPTERA		2913
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	9	
		ALL EPHEMEROPTERA		248
		COLEOPTERA		
		HALIPLUS	1	21
		ALL COLEOPTERA		21
		TRICHOPTERA		
		MYSTACIDES	13	
		PHYLOCENTROPUS	1	
		ALL TRICHOPTERA		289
		ACARINA	6	165
		GASTROPODA		
		AMNICOLA	38	
		GYRAULUS	2	
		HELISOMA	1	
		VALVATA SINCERA	20	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		1322
		PELECYPODA		
		PISIDIUM	188	3884
		ALL PELECYPODA		3884

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 19

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/17/79	2.0	NEMATODA	9	186
		OLIGOCHAETA	55	1136
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	3	62
		ALL POLYCHAETA		62
		AMPHIPODA		
		HYALELLA AZTECA	21	434
		ALL AMPHIPODA		434
		ISOPODA		
		ASELLUS	5	
		LIRCEUS	2	
		ALL ISOPODA		145
		DIPTERA		
		CERATOPOGONIDAE	15	
		CHIRONOMIDAE	79	1632
		EMPIDIDAE	3	
		ALL DIPTERA		2004
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	6	
		ALL EPHEMEROPTERA		186
		TRICHOPTERA		
		MYSTACIDES	4	83
		ALL TRICHOPTERA		83
		GASTROPODA		
		AMNICOLA	26	
		GYRAULUS	2	
		VALVATA SINCERA	1	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		661
		PELECYPODA		
		PISIDIUM	53	1095
		ALL PELECYPODA		1095

MACROBENTHOS OF THE ST. MARYS RIVER STATION 20

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
1/17/79	3.0	CNIDARIA		
		HYDRA	4	83
		ALL CNIDARIA		83
		RHABDOCOELA	1	21
		TRICLADIDA	12	248
		NEMATODA	19	393
		OLIGOCHAETA	238	4917
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA	6	
		ALL AMPHIPODA		145
		ISOPODA		
		ASELLUS	43	
		LIRCEUS	31	
		ALL ISOPODA		1529
		DIPTERA		
		CERATOPOGONIDAE	20	
		CHIRONOMIDAE	435	8987
		ALL DIPTERA		9400
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	4	
		ALL EPHEMEROPTERA		145
		TRICHOPTERA		
		MYSTACIDES	2	
		POLYCENTROPUS	6	
		ALL TRICHOPTERA		165
		ACARINA	4	83
		GASTROPODA		
		AMNICOLA	29	
		PHYSA	4	
		VALVATA SINCERA	1	
		ALL GASTROPODA		702
		PELECYPODA		
		PISIDIUM	14	289
		ALL PELECYPODA		289

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 01

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/18/79	1.0	CNIDARIA		
		HYDRA	8	165
		ALL CNIDARIA		165
		NEMATODA	12	248
		HIRUDINEA	1	21
		OLIGOCHAETA	306	6322
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	63	1302
		ALL POLYCHAETA		1302
		AMPHIPODA		
		HYALELLA	3	62
		ALL AMPHIPODA		62
		ISOPODA		
		ASELLUS	2	41
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	7	
		CHIRONOMIDAE	92	1901
		EMPIDIDAE	10	
		ALL DIPTERA		2252
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	3	
		ALL EPHEMEROPTERA		124
		TRICHOPTERA		
		POLYCENTROPUS	1	21
		ALL TRICHOPTERA		21
		ACARINA	10	207
		GASTROPODA		
		AMNICOLA	94	
		GYRAULUS	21	
		HELISOMA	1	
		VALVATA TRICARINATA	6	
		ALL GASTROPODA		2521
		PELECYPODA		
		PISIDIUM	89	1839
		ALL PELECYPODA		1839

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 02

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/18/79	1.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		HIRUDINEA	1	21
		OLIGOCHAETA	35	723
		AMPHIPODA		
		HYALELLA	1	21
		ALL AMPHIPODA		21
		ISOPODA		
		LIRCEUS	3	62
		ALL ISOPODA		62
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	29	599
		EMPIDIDAE	4	
		ALL DIPTERA		723
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		21
		TRICHOPTERA		
		MYSTACIDES	1	21
		ALL TRICHOPTERA		21
		ACARINA	5	103
		GASTROPODA		
		AMNICOLA	15	
		GYRAULUS	1	
		VALVATA SINCERA	12	
		VALVATA TRICARINATA	10	
		ALL GASTROPODA		785
		PELECYPODA		
		PISIDIUM	26	537
		ALL PELECYPODA		537

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/17/79	1.0	CNIDARIA		
		HYDRA	7	145
		ALL CNIDARIA		145
		RHABDOCOELA	2	41
		NEMATODA	1	21
		OLIGOCHAETA	45	930
		DECAPODA		
		ORCONECTES	1	21
		ALL DECAPODA		21
		OSTRACODA	1	21
		AMPHIPODA		
		GAMMARUS	3	
		HYALELLA	4	
		ALL AMPHIPODA		145
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	3	
		ALL ISOPODA		83
		DIPTERA		
		CHIRONOMIDAE	39	806
		EMPIDIDAE	1	
		ALL DIPTERA		826
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		ALL EPHEMEROPTERA		41
		LEPIDOPTERA	2	41
		TRICHOPTERA		
		MOLANNA	1	
		MYSTACIDES	1	
		ALL TRICHOPTERA		41
		ACARINA	5	103
		GASTROPODA		
		AMNICOLA	16	
		GYRAULUS	5	
		PELTSOMA	2	
		VALVATA SINCERA	9	
		VALVATA TRICARINATA	8	
		ALL GASTROPODA		826
		PELECYPODA		
		PISIDIUM	12	248
		ALL PELECYPODA		248

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 04

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/17/79	2.0	CNIDARIA		
		HYDRA	86	1777
		ALL CNIDARIA		1777
		RHABDOCOELA	2	41
		NEMATODA	4	83
		HIRUDINEA		
		OLIGOCHAETA	67	1384
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	3	62
		ALL POLYCHAETA		62
		OSTRACODA	7	145
		AMPHIPODA		
		HYALELLA AZTECA	23	475
		ALL AMPHIPODA		475
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	3	
		ALL ISOPODA		83
		DIPTERA		
		CHIRONOMIDAE	55	1136
		EMPIDIDAE	5	
		SIMULIIDAE	2	
		ALL DIPTERA		1281
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPEORUS	4	
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		103
		TRICHOPTERA		
		MYSTACIDES	5	103
		ALL TRICHOPTERA		103
		ACARINA	3	62
		GASTROPODA		
		AMNICOLA	119	
		CYRAULUS	17	
		HELISOMA	1	
		PHYSA	12	
		VALVATA SINCERA	75	
		VALVATA TRICARINATA	79	
		ALL GASTROPODA		6260
		PELECYPODA		
		PISIDIUM	58	1198
		ALL PELECYPODA		1198

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 06

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/17/79	1.0	RHABDOCOELA	1	21
		NEMATODA	3	62
		HIRUDINEA	3	62
		OLIGOCHAETA	97	2004
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	136	2810
		ALL POLYCHAETA		2810
		OSTRACODA	1	21
		AMPHIPODA		
		HYALELLA	6	124
		ALL AMPHIPODA		124
		DIPTERA		
		CERATOPOGONIDAE	3	
		CHIRONOMIDAE	233	4814
		EMPIDIDAE	8	
		ALL DIPTERA		5041
		TRICHOPTERA		
		POLYCENTROPUS	1	21
		ALL TRICHOPTERA		21
		ACARINA	3	62
		GASTROPODA		
		AMNICOLA	16	
		GYRAULUS	2	
		HELISOMA	2	
		LYMNAEA	8	
		VALVATA SINCERA	49	
		VALVATA TRICARINATA	62	
		ALL GASTROPODA		2872
		PELECYPODA		
		PISIDIUM	32	661
		ALL PELECYPODA		661

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 07

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/17/79	1.0	CNIDARIA		
		HYDRA	4	83
		ALL CNIDARIA		83
		RHABDOCOELA	1	21
		NEMATODA	30	620
		HIRUDINEA	8	165
		OLIGOCHAETA	275	5681
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	276	5702
		ALL POLYCHAETA		5702
		AMPHIPODA		
		GAMMARUS	3	
		HYALELLA	21	
		ALL AMPHIPODA		496
		DIPTERA		
		CERATOPOGONIDAE	10	
		CHIRONOMIDAE	619	12789
		EMPIDIDAE	4	
		ALL DIPTERA		13078
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	2	
		EPHEMERIDAE		
		EPHEMERA	6	
		HEXAGENIA	2	
		ALL EPHEMEROPTERA		207
		LEPIDOPTERA	2	41
		TRICHOPTERA		
		HYDROPTILIDAE	1	
		MYSTACIDES	7	
		OECETIS	1	
		POLYCENTROPUS	1	
		ALL TRICHOPTERA		207
		ACARINA	9	186
		GASTROPODA		
		AMNICOLA	143	
		GYRAULUS	30	
		HELISOMA	7	
		LYMNAEA	16	
		PHYSA	2	
		VALVATA SINCERA	15	
		VALVATA TRICARINATA	230	
		ALL GASTROPODA		9152
		PELECYPODA		
		PISIDIUM	78	1611
		ALL PELECYPODA		1611

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 08

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/16/79	1.0	NEMATODA	3	62
		HIRUDINEA	1	21
		OLIGOCHAETA	78	1611
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	43	888
		ALL POLYCHAETA		888
		AMPHIPODA		
		HYALELLA AZTECA	6	124
		ALL AMPHIPODA		124
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	113	2335
		EMPIDIDAE	7	
		ALL DIPTERA		2521
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	2	
		EPHEMERIDAE		
		EPHEMERA	5	
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		165
		TRICHOPTERA		
		MOLANNA	1	
		MYSTACIDES	2	
		ALL TRICHOPTERA		62
		ACARINA	6	124
		GASTROPODA		
		AMNICOLA	13	
		GYRAULUS	2	
		HELISOMA	3	
		LYMNAEA	9	
		VALVATA SINCERA	9	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		806
		PELECYPODA		
		PISIDIUM	29	599
		ALL PELECYPODA		599

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 09

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/17/79	2.0	CNIDARIA		
		HYDRA	15	310
		ALL CNIDARIA		310
		NEMATODA	1	21
		HIRUDINEA	6	124
		OLIGOCHAETA	42	868
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	6	124
		ALL POLYCHAETA		124
		AMPHIPODA		
		HYALELLA	1	21
		ALL AMPHIPODA		21
		ISOPODA		
		LIRCEUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CHIRONOMIDAE	79	1632
		EMPIDIDAE	6	
		SIMULIIDAE	2	
		ALL DIPTERA		1797
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	6	
		ALL EPHEMEROPTERA		145
		TRICHOPTERA		
		OECETIS	1	
		POLYCENTROPUS	3	
		ALL TRICHOPTERA		83
		GASTROPODA		
		AMNICOLA	22	
		GYRAULUS	11	
		HELISOMA	6	
		LYMNAEA	9	
		VALVATA SINCERA	64	
		VALVATA TRICARINATA	29	
		ALL GASTROPODA		2913
		PELECYPODA		
		PISIDIUM	57	1178
		ALL PELECYPODA		1178

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 11

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/18/79	1.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		RHABDOCOELA	1	21
		NEMATODA	17	351
		OLIGOCHAETA	144	2975
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	27	558
		ALL POLYCHAETA		558
		OSTRACODA	3	62
		AMPHIPODA		
		HYALELLA	24	496
		ALL AMPHIPODA		496
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	4	
		ALL ISOPODA		103
		DIPTERA		
		CERATOPOGONIDAE	11	
		CHIRONOMIDAE	52	1074
		EMPIDIDAE	1	
		ALL DIPTERA		1322
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	8	
		ALL EPHEMEROPTERA		207
		COLEOPTERA		
		HALIPLIDAE	3	62
		ALL COLEOPTERA		62
		TRICHOPTERA		
		MYSTACIDES	2	41
		ALL TRICHOPTERA		41
		ACARINA	3	62
		GASTROPODA		
		AMNICOLA	45	
		GYRAULUS	5	
		HELISOMA	3	
		LYMNAEA	1	
		PHYSA	7	
		VALVATA SINCERA	60	
		VALVATA TRICARINATA	30	
		ALL GASTROPODA		3016
		PELECYPODA		
		PISIDIUM	94	1942
		ALL PELECYPODA		1942

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 12

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/18/79	1.0	NEMATODA	18	372
		HIRUDINEA	3	62
		OLIGOCHAETA	199	4111
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	18	372
		ALL POLYCHAETA		372
		OSTRACODA	2	41
		AMPHIPODA		
		HYALELLA	6	124
		ALL AMPHIPODA		124
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	5	
		CHIRONOMIDAE	108	2231
		EMPIDIDAE	3	
		ALL DIPTERA		2397
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	5	
		HEXAGENIA	8	
		ALL EPHEMEROPTERA		289
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		MYSTACIDES	6	124
		ALL TRICHOPTERA		124
		ACARINA	2	41
		GASTROPODA		
		AMNICOLA	42	
		GYRAULUS	8	
		HELISOMA	2	
		LYMNAEA	4	
		PHYSA	3	
		VALVATA SINCERA	69	
		VALVATA TRICARINATA	68	
		ALL GASTROPODA		4049
		PELECYPODA		
		PISIDIUM	106	2190
		ALL PELECYPODA		2190

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 13

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/18/79	1.0	OLIGOCHAETA	11	227
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		OSTRACODA	1	21
		DIPTERA		
		CERATOPOGONIDAE	1	
		CHIRONOMIDAE	15	310
		ALL DIPTERA		331
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		ALL EPHEMEROPTERA		21
		GASTROPODA		
		AMNICOLA	9	
		GYRAULUS	7	
		HELISOMA	2	
		LYMNAEA	1	
		VALVATA SINCERA	25	
		VALVATA TRICARINATA	72	
		ALL GASTROPODA		2397
		PELECYPODA		
		PISIDIUM	19	393
		ALL PELECYPODA		393

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 14

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/19/79	2.0	CNIDARIA		
		HYDRA	15	310
		ALL CNIDARIA		310
		NEMATODA	2	41
		HIRUDINEA	1	21
		OLIGOCHAETA	24	496
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		OSTRACODA	2	41
		AMPHIPODA		
		HYALELLA	10	207
		ALL AMPHIPODA		207
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	3	
		ALL ISOPODA		83
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	79	1632
		EMPIDIDAE	1	
		ALL DIPTERA		1694
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	2	
		ALL EPHEMEROPTERA		62
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		MOLANNA	1	
		MYSTACIDES	3	
		POLYCENTROPUS	2	
		ALL TRICHOPTERA		124
		GASTROPODA		
		AMNICOLA	33	
		GYRAULUS	9	
		HELISOMA	2	
		PHYSA	1	
		VALVATA SINCERA	31	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		1632
		PELECYPODA		
		PISIDIUM	31	640
		ALL PELECYPODA		640

MACROBENTHOS OF THE ST. MARYS RIVER STATION 15

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/19/79	3.0	CNIDARIA		
		HYDRA	57	1178
		ALL CNIDARIA		1178
		RHABDOCOELA	12	248
		NEMATODA	2	41
		HIRUDINEA	1	21
		OLIGOCHAETA	72	1488
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	12	248
		ALL POLYCHAETA		248
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA	6	
		ALL AMPHIPODA		145
		DIPTERA		
		CERATOPOGONIDAE	6	
		CHIRONOMIDAE	252	5206
		EMPIDIDAE	3	
		ALL DIPTERA		5392
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	18	
		ALL EPHEMEROPTERA		434
		TRICHOPTERA		
		POLYCENTROPUS	1	21
		ALL TRICHOPTERA		21
		ACARINA	11	227
		GASTROPODA		
		AMNICOLA	63	
		GYRAULUS	4	
		LYMNAEA	2	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		1488
		PELECYPODA		
		PISIDIUM	51	1054
		ALL PELECYPODA		1054

MACROBENTHOS OF THE ST. MARYS RIVER

STATION 16

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/19/79	1.0	RHABDUCOELA	3	62
		TRICLADIDA	14	289
		NEMATODA	32	661
		HIRUDINEA	4	83
		OLIGOCHAETA	480	9979
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	72	1488
		ALL POLYCHAETA		1488
		AMPHIPODA		
		GAMMARUS	2	
		HYALELLA AZTECA	136	
		ALL AMPHIPODA		2851
		ISOPODA		
		ASELLUS	28	
		LIRCEUS	17	
		ALL ISOPODA		930
		DIPTERA		
		CERATOPOGONIDAE	13	
		CHIRONOMIDAE	808	16693
		EMPIDIDAE	3	
		ALL DIPTERA		17024
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	4	
		EPHEMERELLIDAE		
		EPHEMERELLA	1	
		ALL EPHEMEROPTERA		145
		COLEOPTERA		
		HALIPLIDAE	1	21
		ALL COLEOPTERA		21
		LEPIDOPTERA	33	682
		TRICHOPTERA		
		MYSTACIDES	11	
		POLYCENTROPUS	10	
		ALL TRICHOPTERA		434
		ACARINA	19	393
		GASTROPODA		
		AMNICOLA	62	
		GYRAULUS	50	
		LYMNAEA	1	
		VALVATA SINCERA	3	
		VALVATA TRICARINATA	2	
		ALL GASTROPODA		2438
		PELECYPODA		
		PISIDIUM	175	3615
		ALL PELECYPODA		3615

.CROBENTHOS OF THE ST. MARYS RIVER STATION 17

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
/19/79	1.0	RHABDOCOELA	6	124
		TRICLADIDA	1	21
		NEMATODA	102	2107
		HIRUDINEA	5	103
		OLIGOCHAETA	385	7995
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	210	4339
		ALL POLYCHAETA		4339
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	71	
		ALL AMPHIPODA		1488
		ISOPODA		
		ASELLUS	6	
		LIRCEUS	3	
		ALL ISOPODA		186
		DIPTERA		
		CERATOPOGONIDAE	20	
		CHIRONOMIDAE	230	4752
		EMPIDIDAE	4	
		ALL DIPTERA		5248
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	17	
		ALL EPHEMEROPTERA		393
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		MYSTACIDES	2	
		PHYLOCENTROPUS	1	
		POLYCENTROPUS	3	
		ALL TRICHOPTERA		124
		ACARINA	15	310
		GASTROPODA		
		AMNICOLA	99	
		GYRAULUS	4	
		VALVATA SINCERA	53	
		VALVATA TRICARINATA	4	
		ALL GASTROPODA		3306
		PELECYPODA		
		PISIDIUM	257	5310
		ALL PELECYPODA		5310

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 18

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
2/19/79	1.0	RHABDOCOELA	1	21
		NEMATODA	14	269
		HIRUDINEA	3	62
		OLIGOCHAETA	104	2149
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	14	289
		ALL POLYCHAETA		289
		AMPHIPODA		
		HYALELLA	45	930
		ALL AMPHIPODA		930
		ISOPODA		
		ASELLUS	2	41
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	25	
		CHIRONOMIDAE	86	1777
		ALL DIPTERA		2293
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	10	
		ALL EPHEMEROPTERA		269
		TRICHOPTERA		
		MOLANNA	2	
		MYSTACIDES	5	
		OECETIS	1	
		POLYCENTROPUS	2	
		ALL TRICHOPTERA		207
		ACARINA	9	186
		GASTROPODA		
		AMNICOLA	48	
		GYRAULUS	1	
		HELISOMA	1	
		LYMNAEA	3	
		VALVATA SINCERA	48	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		2149
		PELECYPODA		
		PISIDIUM	122	2521
		ALL PELECYPODA		2521

MACROBENTHOS OF THE ST. MARYS RIVER

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	STATION MEAN NO.
2/19/79	3.0	CNIDARIA		
		HYDRA	14	289
		ALL CNIDARIA		289
		RHABDOCOELA	3	62
		NEMATODA	3	62
		HIRUDINEA	7	145
		OLIGOCHAETA	122	2521
		COPEPODA	7	145
		OSTRACODA	3	62
		AMPHIPODA		
		HYALELLA	12	248
		ALL AMPHIPODA		248
		ISOPODA		
		ASELLUS	22	
		LIRCEUS	22	
		ALL ISOPODA		309
		DIPTERA		
		CERATOPOGONIDAE	15	
		CHIRONOMIDAE	370	7644
		EMPIDIDAE	7	
		ALL DIPTERA		8099
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	14	
		ALL EPHEMEROPTERA		289
		COLEOPTERA	1	21
		TRICHOPTERA		
		MYSTACIDES	5	
		PHYLOCENTROPUS	9	
		POLYCENTROPUS	4	
		ALL TRICHOPTERA		372
		ACARINA	8	165
		GASTROPODA		
		AMNICOLA	52	
		GYRAULUS	1	
		PHYSA	8	
		VALVATA SINCERA	17	
		VALVATA TRICARINATA	1	
		ALL GASTROPODA		1632
		PELECYPODA		
		PISIDIUM	113	2335
		ALL PELECYPODA		2335

MACROBENTHOS OF THE ST. MARYS RIVER

STATION 01

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/17/79	1.0	CNIDARIA		
		HYDRA	17	351
		ALL CNIDARIA		351
		RHABDOCOELA	9	186
		NEMATODA	4	83
		HIRUDINEA	9	186
		OLIGOCHAETA	421	8698
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	220	4545
		ALL POLYCHAETA		4545
		COPEPODA	4	83
		AMPHIPODA		
		HYALELLA	29	599
		ALL AMPHIPODA		599
		ISOPODA		
		ASELLUS	4	
		LIRCEUS	2	
		ALL ISOPODA		124
		DIPTERA		
		CERATOPOGONIDAE	7	
		CHIRONOMIDAE	184	3801
		EMPIDIDAE	13	
		ALL DIPTERA		4215
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	5	
		EPHEMERELLIDAE		
		EPHEMERELLA	1	
		ALL EPHEMEROPTERA		207
		LEPIDOPTERA	6	124
		TRICHOPTERA		
		HYDROPTILIDAE	1	
		MYSTACIDES	7	
		PHYLOCENTROPUS	3	
		POLYCENTROPUS	2	
		ALL TRICHOPTERA		269
		ACARINA	8	165
		GASTROPODA		
		AMNICOLA	115	
		GYRAULUS	45	
		LYMNAEA	1	
		PHYSA	4	
		VALVATA SINCERA	48	
		VALVATA TRICARINATA	27	
		ALL GASTROPODA		4958
		PELECYPODA		
		PISIDIUM	136	2810
		ALL PELECYPODA		2810

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 02

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/17/79	1.0	CNIDARIA		
		HYDRA	3	62
		ALL CNIDARIA		62
		OLIGOCHAETA	24	496
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		COPEPODA	3	62
		AMPHIPODA		
		HYALELLA	1	21
		ALL AMPHIPODA		21
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CHIRONOMIDAE	72	1488
		EMPIDIDAE	2	
		ALL DIPTERA		1529
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		ALL EPHEMEROPTERA		21
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	30	
		VALVATA SINCERA	12	
		VALVATA TRICARINATA	2	
		ALL GASTROPODA		909
		PELECYPODA		
		PISIDIUM	9	186
		ALL PELECYPODA		186

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 03

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/17/79	1.0	OLIGOCHAETA	32	661
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		AMPHIPODA		
		HYALELLA	3	62
		ALL AMPHIPODA		62
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	1	
		CHIRONOMIDAE	32	661
		EMPIDIDAE	1	
		ALL DIPTERA		702
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		ALL EPHEMEROPTERA		21
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	15	
		HELISOMA	1	
		LYMNAEA	1	
		VALVATA SINCERA	6	
		VALVATA TRICARINATA	1	
		ALL GASTROPODA		496
		PELECYPODA		
		PISIDIUM	7	145
		ALL PELECYPODA		145

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M
3/17/79	2.0	CNIDARIA		
		HYDRA	38	785
		ALL CNIDARIA		785
		RHABDOCOELA	3	62
		TRICLADIDA	20	413
		NEMATODA	1	21
		HIRUDINEA	23	475
		OLIGOCHAETA	382	7892
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		OSTRACODA	1	21
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA	53	
		ALL AMPHIPODA		1116
		ISOPODA		
		ASELLUS	117	
		LIRCEUS	52	
		ALL ISOPODA		3492
		DIPTERA		
		CERATOPOGONIDAE	4	
		CHIRONOMIDAE	675	13945
		EMPIDIDAE	1	
		SIMULIIDAE	4	
		ALL DIPTERA		14131
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	3	
		ALL EPHEMEROPTERA		62
		LEPIDOPTERA	2	41
		TRICHOPTERA		
		AGRYPNIA	1	
		MYSTACIDES	5	
		PHYLOCENTROPUS	9	
		POLYCENTROPUS	6	
		ALL TRICHOPTERA		434
		GASTROPODA		
		AMNICOLA	432	
		CAMPELOMA	4	
		GONIOBASIS LIVESCENS	5	
		GYRAULUS	52	
		HELISOMA	1	
		PHYSA	50	
		VALVATA SINCERA	104	
		VALVATA TRICARINATA	272	
		ALL GASTROPODA		19007
		PELECYPODA		
		PISIDIUM	205	5479
		ALL PELECYPODA		5479

TE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/17/79	1.0	RHAPDOCOELA	2	41
		NEMATODA	6	124
		HIRUDINEA	6	124
		OLIGOCHAETA	123	2541
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	48	992
		ALL POLYCHAETA		992
		COPEPODA	1	21
		OSTRACODA	6	124
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	9	
		ALL AMPHIPODA		207
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	4	
		CHIRONOMIDAE	291	6012
		EMPIDIDAE	6	
		ALL DIPTERA		6219
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	2	
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	2	
		ALL EPHEMEROPTERA		124
		TRICHOPTERA		
		HYDROPTILA	1	
		MYSTACIDES	1	
		POLYCENTROPUS	2	
		ALL TRICHOPTERA		83
		ACARINA	8	165
		GASTROPODA		
		AMNICOLA	130	
		GYRAULUS	8	
		HELISOMA	8	
		LYMNAEA	9	
		PHYSA	1	
		VALVATA SINCERA	14	
		VALVATA TRICARINATA	66	
		ALL GASTROPODA		4876
		PELECYPODA		
		PISIDIUM	64	1322
		ALL PELECYPODA		1322

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 07

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/17/79	1.0	CNIDARIA		
		HYDRA	12	248
		ALL CNIDARIA		248
		NEMATODA	33	682
		OLIGOCHAETA	122	2521
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	275	5681
		ALL POLYCHAETA		5681
		AMPHIPODA		
		HYALELLA AZTECA	11	227
		ALL AMPHIPODA		227
		DIPTERA		
		CERATOPOGONIDAE	9	
		CHIRONOMIDAE	290	5991
		EMPIDIDAE	5	
		SIMULIIDAE	1	
		ALL DIPTERA		6301
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	5	
		ALL EPHEMEROPTERA		124
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		NYSTACIDES	5	103
		ALL TRICHOPTERA		103
		ACARINA	8	165
		GASTROPODA		
		AMNICOLA	61	
		GYRAULUS	17	
		HELISOMA	2	
		LYMNAEA	4	
		VALVATA SINCERA	99	
		VALVATA TRICARINATA	136	
		ALL GASTROPODA		5805
		PELECYPODA		
		PISIDIUM	45	930
		ALL PELECYPODA		930

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 08

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/17/79	1.0	CNIDARIA		
		HYDRA	5	103
		ALL CNIDARIA		103
		RHABDOCOELA	1	21
		NEMATODA	6	124
		HIRUDINEA	1	21
		OLIGOCHAETA	32	661
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	10	207
		ALL POLYCHAETA		207
		OSTRACODA	1	21
		AMPHIPODA		
		HYALELLA AZTECA	2	41
		ALL AMPHIPODA		41
		DIPTERA		
		CERATOPOGONIDAE	4	
		CHIRONOMIDAE	73	1508
		EMPIDIDAE	1	
		ALL DIPTERA		1611
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		21
		TRICHOPTERA		
		POLYCENTROPUS	1	21
		ALL TRICHOPTERA		21
		ACARINA	3	62
		GASTROPODA		
		AMNICOLA	2	
		GYRAULUS	9	
		HELISOMA	1	
		PHYSA	2	
		VALVATA SINCERA	19	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		744
		PELECYPODA		
		PISIDIUM	12	248
		ALL PELECYPODA		248

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 09

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/17/79	2.0	CNIDARIA		
		HYDRA	15	310
		ALL CNIDARIA		310
		RHABDOCOELA	1	21
		HIRUDINEA	2	41
		OLIGOCHAETA	136	2810
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	2	
		ALL AMPHIPODA		62
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	130	2686
		EMPIDIDAE	3	
		ALL DIPTERA		2789
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	16	
		ALL EPHEMEROPTERA		372
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		HYDROPTILIDAE	1	
		MYSTACIDES	2	
		POLYCENTROPUS	1	
		ALL TRICHOPTERA		83
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	61	
		GYRAULUS	16	
		HELISOMA	18	
		PHYSA	1	
		VALVATA SINCERA	76	
		VALVATA TRICARINATA	64	
		ALL GASTROPODA		4917
		PELECYPODA		
		PISIDIUM	56	1157
		ALL PELECYPODA		1157

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/16/77	1.0	CNIDARIA		
		HYDRA	4	83
		ALL CNIDARIA		83
		RHABDOCOELA	1	21
		NEMATODA	11	227
		HIRUDINEA	6	124
		OLIGOCHAETA	145	3016
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	12	248
		ALL POLYCHAETA		248
		AMPHIPODA		
		GAMMARUS	2	
		HYALELLA AZTECA	34	
		ALL AMPHIPODA		744
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	4	
		ALL ISOPODA		103
		DIPTERA		
		CERATOPOGONIDAE	26	
		CHIRONOMIDAE	105	2169
		EMPIDIDAE	5	
		ALL DIPTERA		2810
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	5	
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	13	
		ALL EPHEMEROPTERA		413
		COLEOPTERA		
		HALIPLIDAE	3	62
		ALL COLEOPTERA		62
		LEPIDOPTERA	3	62
		TRICHOPTERA		
		MYSTACIDES	3	
		POLYCENTROPUS	1	
		ALL TRICHOPTERA		83
		ACARINA	3	62
		GASTROPODA		
		AMNICOLA	36	
		GYRAULUS	8	
		HELISOMA	3	
		LYMNAEA	1	
		PHYSA	6	
		VALVATA SINCERA	95	
		VALVATA TRICARINATA	44	
		ALL GASTROPODA		3987
		PELECYPODA		
		PISIDIUM	82	1694
		ALL PELECYPODA		1694

MACROBENTHOS OF THE ST. MARYS RIVER

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	STATION MEAN NO./
3/16/79	1.0	CNIDARIA		
		HYDRA	2	41
		ALL CNIDARIA		41
		RHABDOCOELA	1	21
		NEMATODA	99	2045
		HIRUDINEA	3	62
		OLIGOCHAETA	666	13760
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	139	2872
		ALL POLYCHAETA		2872
		CUPEPODA	1	21
		AMPHIPODA		
		GAMMARUS	2	
		HYALELLA AZTECA	12	
		ALL AMPHIPODA		289
		ISOPODA		
		ASELLUS	6	
		LIRCEUS	7	
		ALL ISOPODA		269
		DIPTERA		
		CERATOPOGONIDAE	12	
		CHIRONOMIDAE	162	3347
		EMPIDIDAE	4	
		ALL DIPTERA		3677
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	13	
		ALL EPHEMEROPTERA		331
		COLEOPTERA		
		HALIPLIDAE	2	41
		ALL COLEOPTERA		41
		TRICHOPTERA		
		HYDROPTILA	2	
		MYSTACIDES	9	
		ALL TRICHOPTERA		227
		ACARINA	6	124
		GASTROPODA		
		AMNICOLA	62	
		GYRAULUS	14	
		HELISOMA	2	
		PHYSA	1	
		VALVATA SINCERA	7	
		VALVATA TRICARINATA	50	
		ALL GASTROPODA		2410
		PELECYPODA		
		PISIDIUM	95	1763
		ALL PELECYPODA		1763

MACROBENTHOS OF THE ST. MARYS RIVER STATION 13

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/16/79	1.0	RHABDOCOELA	1	21
		NEMATODA	2	41
		OLIGOCHAETA	117	2417
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	49	1012
		ALL POLYCHAETA		1012
		AMPHIPODA		
		HYALELLA AZTECA	5	103
		ALL AMPHIPODA		103
		ISOPODA		
		LIRCEUS	2	41
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	4	
		CHIRONOMIDAE	89	1839
		EMPIDIDAE	5	
		ALL DIPTERA		2025
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		ALL EPHEMEROPTERA		41
		COLEOPTERA		
		PALPEDAE	1	21
		ALL COLEOPTERA		21
		TRICHOPTERA		
		NYSTACIDES	2	
		OECETIS	1	
		ALL TRICHOPTERA		62
		ACARINA	7	145
		GASTROPODA		
		AMNICOLA	94	
		GYRAULUS	11	
		LYMNAEA	1	
		VALVATA SINCERA	15	
		VALVATA TRICARINATA	123	
		ALL GASTROPODA		5041
		PELECYPODA		
		PISIDIUM	46	950
		ALL PELECYPODA		950

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 14

DATE	DEPTH(M.)	TAXA	GRAB COUNTS	MEAN NO./M2
3/16/79	2.0	CNIDARIA		
		HYDRA	31	640
		ALL CNIDARIA		640
		RHABDOCOELA	9	186
		TRICLADIDA	1	21
		NEMATODA	61	1260
		HIRUDINEA	4	83
		OLIGOCHAETA	231	4772
		POLYCHAETA		
		MALACOCERIA SPECIOSA	204	4215
		ALL POLYCHAETA		4215
		OSTRACODA	14	289
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	47	
		ALL AMPHIPODA		992
		ISOPODA		
		ASELLUS	5	
		LIRCEUS	13	
		ALL ISOPODA		372
		DIPTERA		
		CERATOPOGONIDAE	35	
		CHIRONOMIDAE	337	6962
		EMPIDIDAE	3	
		ALL DIPTERA		7747
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	10	
		ALL EPHEMEROPTERA		269
		LEPIDOPTERA	3	62
		TRICHOPTERA		
		MYSTACIDES	6	
		PHYLOCENTROPUS	4	
		POLYCENTROPUS	3	
		ALL TRICHOPTERA		269
		ACARINA	24	496
		GASTROPODA		
		AMNICOLA	108	
		CYRAULUS	41	
		HELISOMA	26	
		LYMNAEA	9	
		PHYSA	2	
		VALVATA SINCERA	272	
		VALVATA TRICARINATA	7	
		ALL GASTROPODA		5601
		PELECYPODA		
		PISIDIUM	124	2562
		ALL PELECYPODA		2562

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 15

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/16/79	3.0	CNIDARIA		
		HYDRA	25	516
		ALL CNIDARIA		516
		RHABDOCOELA	2	41
		NEMATODA	4	83
		HIRUDINEA	7	145
		OLIGOCHAETA	92	1901
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	19	393
		ALL POLYCHAETA		393
		OSTRACODA	8	165
		AMPHIPODA		
		HYALELLA	2	41
		ALL AMPHIPODA		41
		DIPTERA		
		CERATOPOGONIDAE	15	
		CHIRONOMIDAE	268	5537
		EMPIDIDAE	5	
		SIMULIIDAE	1	
		ALL DIPTERA		5971
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	11	
		ALL EPHEMEROPTERA		227
		LEPIDOPTERA	2	41
		TRICHOPTERA		
		HYDROPTILIDAE	1	
		NOLANNA	1	
		MYSTACIDES	4	
		PHYLOCENTROPUS	1	
		ALL TRICHOPTERA		145
		ACARINA	9	186
		GASTROPODA		
		AMNICOLA	17	
		GYRAULUS	4	
		HELISOMA	2	
		PHYSA	1	
		VALVATA SINCERA	27	
		VALVATA TRICARINATA	4	
		ALL GASTROPODA		1136
		PELECYPODA		
		PISIDIUM	55	1136
		ALL PELECYPODA		1136

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/16/79	1.0	CNIDARIA		
		HYDRA	4	83
		ALL CNIDARIA		83
		RHABDOCOELA	7	145
		NEMATODA	6	124
		HIRUDINEA	20	413
		OLIGOCHAETA	268	5537
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	34	702
		ALL POLYCHAETA		702
		COPEPODA	1	21
		OSTRACODA	1	21
		AMPHIPODA		
		HYALELLA	226	4669
		ALL AMPHIPODA		4669
		ISOPODA		
		ASELLUS	19	
		LIRCEUS	23	
		ALL ISOPODA		868
		DIPTERA		
		CERATOPOGONIDAE	21	
		CHIRONOMIDAE	599	12375
		EMPIDIDAE	2	
		ALL DIPTERA		12651
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	7	
		ALL EPHEMEROPTERA		207
		LEPIDOPTERA	33	682
		TRICHOPTERA		
		NYSTACIDES	8	
		PHYLOCENTROPUS	3	
		POLYCENTROPUS	16	
		ALL TRICHOPTERA		558
		HEMIPTERA		
		CORIXIDAE	2	41
		ACARINA	33	682
		GASTROPODA		
		AMNICOLA	120	
		CAMPELOMA	1	
		GYRAULUS	58	
		LYMNAEA	2	
		VALVATA SINCERA	63	
		VALVATA TRICARINATA	9	
		ALL GASTROPODA		5227
		PELECYPODA		
		PISIDIUM	241	4979
		ALL PELECYPODA		4979

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 17

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/16/79	1.0	RHABDOCOELA	3	62
		NEMATODA	18	372
		HIRUDINEA	1	21
		OLIGOCHAETA	39	806
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	19	393
		ALL POLYCHAETA		393
		OSTRACODA	12	248
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	51	
		ALL AMPHIPODA		1074
		ISOPODA		
		ASELLUS	11	
		LIRCEUS	11	
		ALL ISOPODA		455
		DIPTERA		
		CERATOPOGONIDAE	19	
		CHIRONOMIDAE	191	3946
		EMPIDIDAE	2	
		ALL DIPTERA		4380
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	2	
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	6	
		ALL EPHEMEROPTERA		207
		TRICHOPTERA		
		NOLATINA	2	
		MYSTACIDES	3	
		POLYCENTROPUS	5	
		ALL TRICHOPTERA		207
		ACARINA	8	165
		GASTROPODA		
		AMNICOLA	69	
		GYRAULUS	1	
		VALVATA SINCERA	71	
		VALVATA TRICARINATA	1	
		ALL GASTROPODA		2744
		PELECYPODA		
		PISIDIUM	117	
		SPHAERIUM	1	
		ALL PELECYPODA		2436

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 18

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/16/79	1.0	NEMATODA	5	103
		HIRUDINEA	1	21
		OLIGOCHAETA	125	2562
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	37	764
		ALL POLYCHAETA		764
		OSTRACODA	6	124
		AMPHIPODA		
		HYALELLA AZTECA	18	372
		ALL AMPHIPODA		372
		DIPTERA		
		CERATOPOGONIDAE	19	
		CHIRONOMIDAE	89	1839
		EMPIDIDAE	2	
		ALL DIPTERA		2273
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	4	
		HEXAGENIA	11	
		ALL EPHEMEROPTERA		331
		TRICHOPTERA		
		MYSTACIDES	6	124
		ALL TRICHOPTERA		124
		HEMIPTERA		
		CORIXIDAE	1	21
		ACARINA		
		ARRENURUS	1	
		OTHER	10	
		ALL ACARINA		227
		GASTROPODA		
		AMNICOLA	105	
		LYMNAEA	2	
		VALVATA SINCERA	7	
		VALVATA TRICARINATA	7	
		ALL GASTROPODA		2500
		PELECYPODA		
		PISIDIUM	84	1735
		ALL PELECYPODA		1735

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
3/16/79	2.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		RHABDOCOELA	8	165
		TRICLADIDA	41	847
		NEMATODA	21	434
		HIRUDINEA	1	21
		OLIGOCHAETA	154	3182
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		OSTRACODA	3	62
		AMPHIPODA		
		HYALELLA AZTECA	20	413
		ALL AMPHIPODA		413
		ISOPODA		
		ASELLUS	3	
		LIRCEUS	9	
		ALL ISOPODA		248
		DIPTERA		
		CERATOPOGONIDAE	34	
		CHIRONOMIDAE	262	5826
		EMPIDIDAE	7	
		ALL DIPTERA		6673
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	20	
		ALL EPHEMEROPTERA		455
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		MYSTACIDES	13	
		PHYLOCENTROPUS	3	
		POLYCENTROPUS	5	
		TRIAENODES	7	
		ALL TRICHOPTERA		578
		HEMIPTERA		
		CORIXIDAE	2	41
		ACARINA	16	331
		GASTROPODA		
		AMNICOLA	44	
		GYRAULUS	3	
		PHYSA	3	
		VALVATA SINCERA	28	
		VALVATA TRICARINATA	4	
		ALL GASTROPODA		1107
		PELECYPODA		
		PISIDIUM	130	2636
		ALL PELECYPODA		2636

MACROBENTHOS OF THE ST. MARYS RIVER STATION 2

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./
3/16/79	3.0	CNIDARIA		
		HYDRA	2	41
		ALL CNIDARIA		41
		RHABDOCOELA	1	21
		TRICLADIDA	3	62
		NEMATODA	21	434
		HIRUDINEA	1	21
		OLIGOCHAETA	105	2169
		COPEPODA	2	41
		OSTRACODA	1	21
		AMPHIPODA		
		HYALELLA AZTECA	3	62
		ALL AMPHIPODA		62
		ISOPODA		
		ASELLUS	14	
		LIRCEUS	2	
		ALL ISOPODA		331
		DIPTERA		
		CERATOPOGONIDAE	11	
		CHIRONOMIDAE	275	5681
		EMPIDIDAE	2	
		ALL DIPTERA		5950
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	16	
		ALL EPHEMEROPTERA		331
		TRICHOPTERA		
		MYSTACIDES	3	
		PHYLOCENTROPUS	9	
		POLYCENTROPUS	3	
		ALL TRICHOPTERA		310
		ACARINA	9	186
		GASTROPODA		
		AMNICOLA	35	
		VALVATA SINCERA	1	
		ALL GASTROPODA		744
		PELECYPODA		
		PISIDIUM	90	1859
		ALL PELECYPODA		1859

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 01

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/19/79	1.0	CNIDARIA		
		HYDRA	5	103
		ALL CNIDARIA		103
		NEMATODA	2	41
		OLIGOCHAETA	103	2128
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	46	950
		ALL POLYCHAETA		950
		OSTRACODA	1	21
		AMPHIPODA		
		HYALELLA	2	41
		ALL AMPHIPODA		41
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	88	1813
		ALL DIPTERA		1859
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	6	
		ALL EPHEMEROPTERA		145
		LEPIDOPTERA	1	21
		ACARINA	7	145
		GASTROPODA		
		AMNICOLA	111	
		GYRAULUS	33	
		LYMNAEA	1	
		PHYSA	1	
		VALVATA SINCERA	35	
		VALVATA TRICARINATA	23	
		ALL GASTROPODA		4215
		PELECYPODA		
		PISIDIUM	100	2066
		ALL PELECYPODA		2066

MACROBENTHOS OF THE ST. MARYS RIVER

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	STATION MEAN NO.
4/19/79	1.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		OLIGOCHAETA	21	434
		OSTRACODA	1	21
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA	1	
		ALL AMPHIPODA		41
		DIPTERA		
		CHIRONOMIDAE	26	537
		EMPIDIDAE	2	
		ALL DIPTERA		578
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		ALL EPHEMEROPTERA		21
		GASTROPODA		
		AMNICOLA	17	
		GYRAULUS	2	
		VALVATA TRICARINATA	3	
		ALL GASTROPODA		455
		PELECYPODA		
		PISIDIUM	2	41
		ALL PELECYPODA		41

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 03

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/19/79	1.0	NEMATODA	1	21
		OLIGOCHAETA	71	1467
		COPEPODA	1	21
		AMPHIPODA		
		HYALELLA	2	41
		ALL AMPHIPODA		41
		DIPTERA		
		CERATOPOGONIDAE	1	
		CHIRONOMIDAE	91	1880
		ALL DIPTERA		1901
		EPHEMEROPTERA		
		BAETISCIDAE		
		BAETISCA	1	
		ALL EPHEMEROPTERA		21
		LEPIDOPTERA	1	21
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	23	
		GONIOBASIS LIVESCENS	1	
		VALVATA SINCERA	17	
		VALVATA TRICARINATA	7	
		ALL GASTROPODA		992
		PELECYPODA		
		PISIDIUM	7	145
		ALL PELECYPODA		145

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 04

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/19/79	2.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		RHABDOCOELA	1	21
		HIRUDINEA	1	21
		OLIGOCHAETA	41	847
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	4	
		CHIRONOMIDAE	101	2087
		EMPIDIDAE	4	
		ALL DIPTERA		2252
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		ALL EPHEMEROPTERA		21
		GASTROPODA		
		AMNICOLA	149	
		GONIOBASIS LIVESCENS	2	
		GYRAULUS	4	
		PHYSA	1	
		VALVATA SINCERA	21	
		VALVATA TRICARINATA	40	
		ALL GASTROPODA		4463
		PELECYPODA		
		PISIDIUM	111	2293
		ALL PELECYPODA		2293

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 06

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/19/79	1.0	CNIDARIA		
		HYDRA	4	83
		ALL CNIDARIA		83
		RHABDOCOELA	5	103
		NEMATODA	5	103
		HIRUDINEA	4	83
		OLIGOCHAETA	161	3326
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	111	2293
		ALL POLYCHAETA		2293
		AMPHIPODA		
		HYALELLA AZTECA	8	165
		ALL AMPHIPODA		165
		ISOPODA		
		ASELLUS	2	41
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	11	
		CHIRONOMIDAE	196	4049
		ALL DIPTERA		4277
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	3	
		HEXAGENIA	6	
		ALL EPHEMEROPTERA		186
		LEPIDOPTERA	2	41
		TRICHOPTERA		
		MOLANNA	1	
		MYSTACIDES	1	
		SETODES	1	
		ALL TRICHOPTERA		62
		ACARINA	9	186
		GASTROPODA		
		AMNICOLA	87	
		GYRAULUS	39	
		HELISOMA	11	
		LYMNAEA	6	
		VALVATA SINCERA	214	
		VALVATA TRICARINATA	157	
		ALL GASTROPODA		10661
		PELECYPODA		
		PISIDIUM	157	3244
		ALL PELECYPODA		3244

MACROBENTHOS OF THE ST. MARYS RIVER

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	STATION MEAN NO./
4/19/79	1.0	CNIDARIA		
		HYDRA	3	62
		ALL CNIDARIA		62
		RHABDOCOELA	2	41
		NEMATODA	2	41
		OLIGOCHAETA	36	744
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	32	661
		ALL POLYCHAETA		661
		COPEPODA	1	21
		OSTRACODA	4	83
		AMPHIPODA		
		HYALELLA	10	207
		ALL AMPHIPODA		207
		ISOPODA		
		ASELLUS	1	21
		ALL ISOPODA		21
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	78	1611
		EMPIDIDAE	2	
		ALL DIPTERA		1694
		EPHEMEROPTERA	3	62
		TRICHOPTERA		
		HYDROPTILA	1	
		NOLANDIA	2	
		TRIAENODES	1	
		ALL TRICHOPTERA		83
		ACARINA	6	124
		GASTROPODA		
		AMNICOLA	22	
		GYRAULUS	26	
		LYMNAEA	8	
		VALVATA SINCERA	21	
		VALVATA TRICARINATA	46	
		ALL GASTROPODA		2541
		PELECYPODA		
		PISIDIUM	16	331
		ALL PELECYPODA		331

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 08

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/19/79	1.0	CNIDARIA		
		HYDRA	4	83
		ALL CNIDARIA		83
		OLIGOCHAETA	24	496
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	5	103
		ALL POLYCHAETA		103
		COPEPODA	1	21
		OSTRACODA	5	103
		AMPHIPODA		
		HYALELLA	3	62
		ALL AMPHIPODA		62
		DIPTERA		
		CERATOPOGONIDAE	1	
		CHIRONOMIDAE	68	1405
		EMPIDIDAE	3	
		ALL DIPTERA		1488
		TRICHOPTERA		
		MYSTACIDES	1	21
		ALL TRICHOPTERA		21
		ACARINA	1	21
		GASTROPODA		
		AMNICOLA	25	
		GYRAULUS	15	
		LYMNAEA	4	
		VALVATA SINCERA	8	
		VALVATA TRICARINATA	21	
		ALL GASTROPODA		1508
		PELECYPODA		
		PISIDIUM	10	207
		ALL PELECYPODA		207

MACROBENTHOS OF THE ST. MARYS RIVER

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	STATION MEAN NO./
4/19/79	2.0	CNIDARIA		
		HYDRA	1	21
		ALL CNIDARIA		21
		HIRUDINEA	2	41
		OLIGOCHAETA	21	434
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	10	207
		ALL POLYCHAETA		207
		AMPHIPODA		
		HYALELLA AZTECA	1	21
		ALL AMPHIPODA		21
		DIPTERA		
		CERATOPOGONIDAE	2	
		CHIRONOMIDAE	33	682
		ALL DIPTERA		723
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		21
		TRICHOPTERA		
		MYSTACIDES	1	21
		ALL TRICHOPTERA		21
		ACARINA	2	41
		GASTROPODA		
		AMNICOLA	28	
		GYRAULUS	1	
		HELISOMA	6	
		LYMNAEA	1	
		PHYSA	1	
		VALVATA SINCERA	12	
		VALVATA TRICARINATA	33	
		ALL GASTROPODA		1694
		PELECYPODA		
		PISIDIUM	11	227
		ALL PELECYPODA		227

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 11

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/16/79	1.0	RHABDOCOELA	1	21
		NEMATODA	32	661
		HIRUDINEA	3	62
		OLIGOCHAETA	111	2293
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	41	847
		ALL POLYCHAETA		847
		AMPHIPODA		
		HYALELLA	10	207
		ALL AMPHIPODA		207
		ISOPODA		
		LIRCEUS	2	41
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	4	
		CHIRONOMIDAE	52	1074
		EMPIDIDAE	2	
		ALL DIPTERA		1198
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	5	
		ALL EPHEMEROPTERA		145
		COLEOPTERA		
		HALIPLIDAE	1	21
		ALL COLEOPTERA		21
		TRICHOPTERA		
		MYSTACIDES	1	
		POLYCENTROPUS	1	
		TRIAENODES	1	
		ALL TRICHOPTERA		62
		GASTROPODA		
		AMNICOLA	15	
		GYRAULUS	3	
		PHYSA	2	
		VALVATA SINCERA	15	
		VALVATA TRICARINATA	7	
		ALL GASTROPODA		665
		PELECYPODA		
		PISIDIUM	29	599
		ALL PELECYPODA		599

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 1

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M
4/18/79	1.0	CNIDARIA		
		HYDRA	3	62
		ALL CNIDARIA		62
		RHABDOCOELA	2	41
		NEMATODA	50	1033
		HIRUDINEA	3	62
		OLIGOCHAETA	494	10206
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	233	4814
		ALL POLYCHAETA		4814
		OSTRACODA	3	62
		AMPHIPODA		
		HYALELLA AZTECA	13	269
		ALL AMPHIPODA		269
		ISOPODA		
		ASELLUS	1	
		LIRCEUS	3	
		ALL ISOPODA		83
		DIPTERA		
		CERATOPOGONIDAE	11	
		CHIRONOMIDAE	112	2314
		EMPIDIDAE	7	
		ALL DIPTERA		2566
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	4	
		HEXAGENIA	8	
		ALL EPHEMEROPTERA		248
		LEPIDOPTERA	1	21
		TRICHOPTERA		
		MYSTACIDES	3	62
		ALL TRICHOPTERA		62
		ACARINA	2	41
		GASTROPODA		
		AMNICOLA	32	
		GYRAULUS	10	
		HELISOMA	4	
		LYMNAEA	1	
		VALVATA SINCERA	52	
		VALVATA TRICARINATA	63	
		ALL GASTROPODA		3347
		PELECYPODA		
		PISIDIUM	104	2149
		ALL PELECYPODA		2149

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 13

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/18/79	1.0	RHABDOCOELA	1	21
		NEMATODA	1	21
		HIRUDINEA	3	62
		OLIGOCHAETA	73	1508
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	11	227
		ALL POLYCHAETA		227
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA	15	
		ALL AMPHIPODA		331
		DIPTERA		
		CHIRONOMIDAE	82	1694
		EMPIDIDAE	4	
		ALL DIPTERA		1777
		EPHEMEROPTERA		
		EPHEMERIDAE		
		HEXAGENIA	1	
		ALL EPHEMEROPTERA		21
		TRICHOPTERA		
		NOLANNA	1	
		MYSTACIDES	2	
		ALL TRICHOPTERA		62
		ACARINA	5	103
		GASTROPODA		
		AMNICOLA	102	
		GYRAULUS	1	
		HELISOMA	1	
		LYMNAEA	5	
		PHYSA	1	
		VALVATA SINCERA	75	
		VALVATA TRICARINATA	173	
		ALL GASTROPODA		7396
		PELECYPODA		
		PISIDIUM	87	1797
		ALL PELECYPODA		1797

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/20/79	.60	CNIDARIA		
		HYDRA	15	413
		ALL CNIDARIA		310
		RHABDOCOELA	15	310
		TRICLADIDA	4	83
		NEMERTINEA	1	21
		NEMATODA	58	1196
		HIRUDINEA	9	186
		OLIGOCHAETA	532	10991
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	13	269
		ALL POLYCHAETA		269
		OSTRACODA	14	289
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	51	
		ALL AMPHIPODA		1074
		ISOPODA		
		ASELLUS	4	
		LIRCEUS	13	
		ALL ISOPODA		351
		DIPTERA		
		CERATOPOGONIDAE	27	
		CHIRONOMIDAE	350	7231
		EMPIDIDAE	4	
		ALL DIPTERA		7871
		EPHEMEROPTERA		
		EPHEMEROPTERA		
		CAENIS	1	
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	16	
		ALL EPHEMEROPTERA		393
		COLEOPTERA		
		CYTISCIDAE	1	21
		ALL COLEOPTERA		21
		LEPIDOPTERA	7	145
		TRICHOPTERA		
		MYSTACIDES	7	
		OECETIS	1	
		PSYCHOMYIIDAE	1	
		POLYCENTROPUS	6	
		ALL TRICHOPTERA		310
		ACARINA	22	455
		GASTROPODA		
		AMNICOLA	41	
		CAMPELOMA	1	
		GYRAULUS	36	
		PHYSELLA	4	
		LYMNAEA	3	
		PERIA	4	
		VALVATA SINCERA	17	
		VALVATA TRICARINATA	10	
		SUBTOTAL		6663
		PELECYPODA		
		PISIDIUM	136	2810
		SUBTOTAL		2810

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 15

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/20/79	3.0	CNIDARIA		
		HYDRA	2	41
		ALL CNIDARIA		41
		RHABDOCOELA	6	124
		NEMERTINEA	1	21
		NEMATODA	58	1198
		OLIGOCHAETA	178	3677
		POLYCHAETA	2	41
		OSTRACODA	8	165
		AMPHIPODA		
		HYALELLA AZTECA	2	41
		ALL AMPHIPODA		41
		DIPTERA		
		CHIRONOMIDAE	294	6074
		EMPIDIDAE	3	
		ALL DIPTERA		6136
		TRICHOPTERA		
		CHEUMATOPSYCHE	1	
		PHYLOCENTROPUS	1	
		ALL TRICHOPTERA		41
		ACARINA	2	41
		GASTROPODA		
		CAMPELOMA	1	
		VALVATA SINCERA	1	
		ALL GASTROPODA		41
		PELECYPODA		
		PISIDIUM	56	1157
		ALL PELECYPODA		1157

MACROBENTHOS OF THE ST. MARYS RIVER

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	STATION MEAN NO
4/18/79	1.0	RHABDOCOELA	17	351
		NEMERTINEA	1	21
		NEMATODA	57	1178
		HIRUDINEA	21	434
		OLIGOCHAETA	941	19441
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	35	723
		ALL POLYCHAETA		723
		OSTRACODA	3	62
		AMPHIPODA		
		GAMMARUS	1	
		HYALELLA AZTECA	203	
		ALL AMPHIPODA		4215
		ISOPODA		
		ASELLUS	16	
		LIRCEUS	12	
		ALL ISOPODA		578
		DIPTERA		
		CERATOPOGONIDAE	37	
		CHIRONOMIDAE	564	11652
		EMPIDIDAE	3	
		ALL DIPTERA		12479
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	8	
		ALL EPHEMEROPTERA		186
		LEPIDOPTERA	15	310
		TRICHOPTERA		
		MYSTACIDES	23	
		PHYLOCENTROPUS	4	
		POLYCENTROPUS	12	
		TRIAENODES	1	
		ALL TRICHOPTERA		826
		HEMIPTERA		
		CORIXIDAE	4	83
		ACARINA	16	331
		GASTROPODA		
		AMNICOLA	14	
		GYRAULUS	17	
		PHYSA	2	
		VALVATA SINCERA	22	
		VALVATA TRICARINATA	1	
		ALL GASTROPODA		1157
		PELECYPODA		
		PISIDIUM	24	593
		ALL PELECYPODA		593

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 17

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/18/79	1.0	RHABDOCOELA	4	83
		NEMATODA	18	372
		HIRUDINEA	3	62
		OLIGOCHAETA	177	3657
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	81	1673
		ALL POLYCHAETA		1673
		OSTRACODA	6	124
		AMPHIPODA		
		HYALELLA	27	558
		ALL AMPHIPODA		558
		ISOPODA		
		LIRCEUS	3	62
		ALL ISOPODA		62
		DIPTERA		
		CERATOPOGONIDAE	10	
		CHIRONOMIDAE	85	1756
		ALL DIPTERA		1963
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	5	
		HEXAGENIA	17	
		ALL EPHEMEROPTERA		455
		TRICHOPTERA		
		POLANNA	1	
		MYSTACIDES	1	
		OECETIS	1	
		POLYCENTROPUS	1	
		TRIAENODES	1	
		ALL TRICHOPTERA		103
		HEMIPTERA		
		CORIXIDAE	1	21
		ACARINA	4	83
		GASTROPODA		
		AMNICOLA	46	
		GYRAULUS	3	
		HELISOMA	1	
		LYMNAEA	1	
		VALVATA SINCERA	6	
		VALVATA TRICARINATA	2	
		ALL GASTROPODA		1219
		PELECYPODA		
		PISIDIUM	92	1901
		ALL PELECYPODA		1901

MACROBENTHOS OF THE ST. MARYS RIVER

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	STATION MEAN NO.
4/16/79	1.0	RHABDOCOELA	1	21
		NEMATODA	13	269
		HIRUDINEA	4	83
		OLIGOCHAETA	212	4380
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	109	2252
		ALL POLYCHAETA		2252
		OSTRACODA	9	186
		AMPHIPODA		
		HYALELLA AZTECA	25	516
		ALL AMPHIPODA		516
		DIPTERA		
		CERATOPOGONIDAE	6	
		CHIRONOMIDAE	118	2438
		ALL DIPTERA		2562
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	7	
		ALL EPHEMEROPTERA		186
		TRICHOPTERA		
		NOLANDA	2	
		MYSTACIDES	10	
		OECETIS	1	
		ALL TRICHOPTERA		269
		ACARINA	5	103
		GASTROPODA		
		AMNICOLA	98	
		HELISOMA	1	
		VALVATA SINCERA	14	
		VALVATA TRICARINATA	4	
		ALL GASTROPODA		2417
		PELECYPODA		
		PISIDIUM	122	2521
		ALL PELECYPODA		2521

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 19

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/18/79	2.0	RHABDOCOELA	2	41
		NEMATODA	10	207
		HIRUDINEA	4	83
		OLIGOCHAETA	163	3366
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	25	516
		ALL POLYCHAETA		516
		COPEPODA	1	21
		OSTRACODA	1	21
		AMPHIPODA		
		GAMMARUS	3	
		HYALELLA AZTECA	24	
		ALL AMPHIPODA		558
		ISOPODA		
		LIRCEUS	2	41
		ALL ISOPODA		41
		DIPTERA		
		CERATOPOGONIDAE	9	
		CHIRONOMIDAE	135	2789
		EMPIDIDAE	1	
		ALL DIPTERA		2996
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	1	
		HEXAGENIA	6	
		ALL EPHEMEROPTERA		145
		TRICHOPTERA		
		OECETIS	1	
		POLYCENTROPUS	3	
		ALL TRICHOPTERA		83
		HEMIPTERA		
		CORIXIDAE	1	21
		ACARINA	5	103
		GASTROPODA		
		ANCYLIDAE	59	
		GYRAULUS	2	
		HELISOMA	3	
		LYMNAEA	1	
		VALVATA SINCERA	15	
		VALVATA TRICARINATA	11	
		ALL GASTROPODA		1090
		PELECYPODA		
		PISIDIUM	41	847
		ALL PELECYPODA		947

MACROBENTHOS OF THE ST. MARYS RIVER — STATION 20

DATE	DEPTH(M.)	TAXON	--GRAB COUNTS--	MEAN NO./M2
4/18/79	3.0	RHABDOCOELA	7	145
		TRICLADIDA	5	103
		NEMATODA	5	103
		OLIGOCHAETA	96	1983
		POLYCHAETA		
		MANAYUNKIA SPECIOSA	3	62
		ALL POLYCHAETA		62
		OSTRACODA	21	434
		AMPHIPODA		
		HYALELLA AZTECA	17	351
		ALL AMPHIPODA		351
		ISOPODA		
		LIRCEUS	3	62
		ALL ISOPODA		62
		DIPTERA		
		CERATOPOGONIDAE	9	
		CHIRONOMIDAE	135	2789
		EMPIDIDAE	1	
		ALL DIPTERA		2996
		EPHEMEROPTERA		
		EPHEMERIDAE		
		EPHEMERA	2	
		HEXAGENIA	10	
		ALL EPHEMEROPTERA		248
		COLEOPTERA		
		HALIPLIDAE	1	21
		ALL COLEOPTERA		21
		TRICHOPTERA		
		MYSTACIDES	11	
		OECETIS	1	
		POLYCENTROPUS	2	
		ALL TRICHOPTERA		289
		HEMIPTERA		
		CORIXIDAE	2	41
		ACARINA	13	269
		GASTROPODA		
		AMNICOLA	45	
		GYRAULUS	7	
		HELISOMA	3	
		PHYSA	1	
		VALVATA SINCERA	18	
		VALVATA TRICARINATA	6	
		ALL GASTROPODA		1653
		PELECYPODA		
		PISIDIUM	157	3244
		ALL PELECYPODA		3244

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Appendix 2. Drift net catches at Frechette Point and Six Mile Point in the St. Marys River, February 15-April 21, 1979.

Catches in drift nets fished at the Frechette Point high impact site, February 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished				
		2/15	2/15-16		2/16	
		0900-1700	1700-1030	1030-1230	1230-1400	1400-1600
	Macroinvertebrates					
7a	Mysis relicta	0	13	0	0	0
	Gyraulus	0	0	2	0	0
	Caenis	0	0	0	1	0
	Paraleptophlebia	0	0	0	0	1
	Chironomidae	0	0	0	1	0
7b	Mysis relicta	0	1	0	0	0
	Gammarus	0	1	0	0	0
	Gyraulus	0	0	0	0	1
	Valvata sincera	0	0	10	0	0
	Hydra	0	0	0	28	27
	Hexagenia	0	2	0	0	0
	Mystacides	0	0	0	2	0
	Chironomidae	0	0	6	5	1
7c	Chironomidae	0	0	0	1	0
	Oligochaeta	0	0	1	0	0
	Hydra	0	0	12	38	27
7d	Hydra	0	0	51	5	4
	Mystacides	0	0	0	2	0
	Chrionomidae	0	0	5	1	6
Total macroinvertebrate catch		0	17	87	84	67
	Macrophytes					
7a		0	0	39.0	114.2	124.6
7b		0	0	19.6	45.8	133.4
7c		0	0	0	0	1.4
7d		0	0	0	0	78.4
Total macrophyte catch		0	0	58.6	160.0	337.8

(table continued)

Station number	Component of catch	Dates and hours nets fished: 2/15 0900-1700	2/15-16 1700-1030	2/16 1030-1230	2/16 1230-1400	2/16 1400-1600
	Detritus					
7a		0.099	0.456	0.044	1.103	0.109
7b		0.175	0.368	0.384	5.497	0.971
7c		0.194	0.506	0.952	11.058	0.468
7d		0.093	1.226	0.522	14.643	0.719
Total detritus catch		0.561	2.556	1.902	32.301	2.267
	Fish					
7d	Cottus spp.	0	1	0	0	0

Catches in drift nets fished at the Frechette Point high impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished 3/13-14 1515-1030	3/14 1030-1730	3/17-18 1445-0900
	Macroinvertebrates			
7	Hirudinea	0	1	0
	Ephemera	0	1	0
	Agrypnia	1	0	0
9	Chaoborus	0	1	0
10		0	0	0
Total macroinvertebrate catch		1	3	0
	Macrophytes			
7		22.20	252.92	0
9		6.40	0	104.48
10		96.56	18.82	21.00
Total macrophyte catch		125.16	271.74	125.48
	Detritus			
7		1.227	4.657	2.441
9		0.877	8.839	1.407
10		1.092	2.706	2.489
Total detritus weight		3.196	16.202	6.337

Catches in drift nets fished at Frechette Point low impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished 3/13-14 1500-0930	3/14 0930-1745	3/17-18 1500-1000
	Macroinvertebrates			
2		0	0	0
4	Amnicola	0	0	3
	Physa	0	0	1
	Lirceus	1	1	0
	Hydracarina	1	0	0
	Simulidae	4	0	0
	Chironomidae	2	0	0
5	Gammarus	1	0	0
	Hexagenia	1	0	0
	Baetidae	1	0	0
	Simulidae	3	0	0
Total macroinvertebrate catch		14	1	4
	Macrophytes			
2		0	0	0
4		0	16.80	53.26
5		0	2.42	0
Total macrophyte catch		0	19.22	53.26
	Detritus			
2		0.112	3.666	0.478
4		0.402	0.175	0.544
5		0.763	0.934	0.471
Total detritus weight		1.277	4.775	1.493
	Fish			
4	Cottus spp.	0	0	1

Catches in drift nets fished at the Frechette Point high impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished		
		4/20-21	4/21	
		1600-1330	1330-1530	1530-1730
	Macroinvertebrates			
7		0	0	0
9	Hexagenia	0	1	0
10		0	0	0
Total macroinvertebrate catch		0	1	0
	Macrophytes			
7		0	0	0
9		0	9.88	0
10		0	0	0
Total macrophyte catch		0	9.88	0
	Detritus			
7		0	0	0
9		14.083	3.506	2.029
10		0	0	0
Total detritus weight		14.083	3.506	2.029

Catches in drift nets fished at the Frechette Point low impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished: 4/20-21 1500-0930	4/21 0930-1100	4/21 1100-1300	4/21 1300-1500	4/21 1500-1700
	Macroinvertebrates					
2	Mysis relicta	1	0	1	0	0
	Baetisca	0	0	1	0	0
	Chironomidae	0	0	1	0	0
4	Hexagenia	0	3	1	0	0
	Ephemera	0	3	0	0	0
	Chironomidae	0	0	1	0	0
5	Campeloma	0	1	0	0	0
	Hexagenia	0	3	0	0	0
Total macroinvertebrate catch		1	10	5	0	0
	Macrophytes					
2		0	0	0	10.84	14.14
4		0	0	2.90	0	0
5		0	0	0	0	0
Total macrophyte catch		0	0	2.90	10.84	14.14
	Detritus					
2		3.810	0.846	0.204	0.549	0.562
4		1.772	15.209	0.511	0.122	0.295
5		0.770	1.464	0.289	0.701	1.312
Total detritus weight		6.359	17.519	1.004	1.372	2.169

Catches in drift nets fished at the Six Mile Point high impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished 3/13-14 1545-1045	3/14 1045-1715	3/17-18 1415-0930
	Macroinvertebrates			
12	Physa	1	0	0
14		0	0	0
15		0	0	0
Total macroinvertebrate catch		1	0	0
	Macrophytes			
12		107.28	90.48	144.22
14		17.12	34.62	0
15		52.76	5.86	12.36
Total macrophyte catch		177.16	130.96	156.58
	Detritus			
12		0.045	0.095	0.013
14		0.238	0.242	0.307
15		0.211	0.100	0.074
Total detritus weight		0.494	0.437	0.394

Catches in drift nets fished at the Six Mile Point low impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished 3/13-14 1615-1130	3/14 1130-1700	3/17-18 1400-0915
	Macroinvertebrates			
17	Corixidae	0	1	0
	Lirceus	1	0	0
19	Amnicola	1	0	0
	Mysis relicta	3	0	2
20	Physa	0	1	0
	Mysis relicta	1	0	1
	Isonychia	0	0	1
Total macroinvertebrate catch		6	2	4
	Macrophytes			
17		21.32	83.32	0
19		0	14.12	0
20		25.98	5.48	0
Total macrophyte catch		47.30	102.92	0
	Detritus			
17		0.085	0.269	0.407
19		0.459	1.453	0.238
20		1.172	1.738	0.833
Total detritus weight		1.716	3.460	1.478

Appendix 3. Record of vessel passage made through the St. Marys River for January 16-19, February 13-19, March 11-18, and April 18-21, 1979.

Catches in drift nets fished at the Six Mile Point high impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished 4/21 1400-1600	4/21 1600-1800
	Macroinvertebrates		
12		0	0
14		0	0
15		0	0
Total macroinvertebrate catch		0	0
	Macrophytes		
12		1.44	82.20
14		0	0
15		0	0
Total macrophyte catch		1.44	82.20
	Detritus		
12		3.655	0.109
14		0	0
15		1.164	0.675
Total detritus weight		4.819	0.784

Catches in drift nets fished at the Six Mile Point low impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm^2; detritus is dry weight in grams.]

Station number	Component of catch	Dates and hours nets fished 4/21 1430-1630	4/21 1630-1830
	Macroinvertebrates		
17		0	0
19	Amnicola	0	1
	Lirceus	0	1
	Chironomidae	0	1
20		0	0
Total macroinvertebrate catch		0	3
	Macrophytes		
17		0	0
19		0	10.58
20		0	0
Total macrophyte catch		0	10.58
	Detritus		
17		0	0
19		0.071	0.308
20		0.050	0.009
Total detritus weight		0.121	0.317

Record of vessel passage made through the St. Marys River for January 16-19, February 13-19, March 11-18, and April 18-21, 1979. [U.S. Coast Guard Radio Log data provided by telephone, July 16, 1979, by QM 1C, K. Andrea, U.S. Coast Guard Station, Sault Ste. Marie, Michigan; (a) estimate provided by K. Andrea; (b) data from Alger, 1979.]

Date	Vessel Name	Direction	Date reported reaching Nine Mile Point	Date and Time vessel estimated (a)/ observed (b) reaching study area	
				Date	Time
1/16	Presque Isle	upbound	22:29		
	A.M. Anderson	upbound	22:46		
	A.H. Ferbert	upbound	23:35		
1/17	W. Cohen	upbound	17:28		
2/15	P.R. Clarke	upbound	23:11	2/16	12:50[b]
	C.J. Callaway	upbound	23:25	2/16	13:04[b]
2/16	J.G. Munson	upbound	09:39	2/16	13:28[b]
3/11	A.M. Anderson	upbound	13:14	3/13	09:00[a]
	P.R. Clarke	upbound	13:23	3/13	09:15[a]
3/14	Imperial St. Clair	upbound	10:20	3/14	11:02[b]
	C.J. Callaway	downbound	10:46		
	R. Blough	downbound	16:26		
3/18	Imperial St. Clair	downbound	06:23		
	C.J. Callaway	upbound	18:30		
	R. Blough	upbound	23:12		
4/18	R. Blough	downbound	09:00		
	C.J. Callaway	downbound	09:53		
	Fort Chambly	downbound	10:21		
	J. Dykstra	downbound	10:56		
	E.R. Breach	downbound	12:23		
4/19	Bai Como II	upbound	22:34		
	G.A. Stinson	upbound	23:02		
	C.M. White	downbound	02:07		
	Sharon	downbound	04:14		
	Tadoussaz	downbound	09:53		
	P.D. Block	downbound	15:22		
	J.N. McWaters	downbound	20:35		
	J.O. McKellar	downbound	22:14		

Table continued

Date	Vessel Name	Direction	Date reported reaching Nine Mile Point	Date and Time vessel estimated (a)/ observed (b) reaching study area	
				Date	Time
4/19	E.L. Ryerson	upbound	23:45		
4/20	Quedock	upbound	04:00		
	A.M. Anderson	upbound	05:00		
	A.H. Ferbert	upbound	14:18		
	Senniville	upbound	15:11		
	E.D. Barber	upbound	16:01		
	R. Indiana	upbound	16:35		
	Federal St. Laurent	upbound	17:12		
	Texaco Warrior	upbound	19:20		
	Elton Hoyt	upbound	23:02		
	Quetico	upbound	23:03		
	Armco	downbound	00:45		
	G.L. Mauthe	downbound	01:50		
	West Run	downbound	10:54		
	C. Victory	downbound	07:51		
	Hochelaga	downbound	14:21		
	L.R. Desmarais	downbound	15:25		
	Doan Transport	downbound	14:44		
	Canadock	downbound	16:29		
	E.B. Green	downbound	21:19		
4/21	P. Thayer	upbound	04:13		
	W.R. Roesch	upbound	06:29		
	M. Miner	upbound	09:41		
	Lake Shell	upbound	13:36		
	C. Callaway	upbound	13:48		
	E.R. Breach	upbound	14:25		
	Georgian Bay	upbound	20:44		
	E.L. Block	downbound	06:25		
	Elgo Soo	downbound	07:10		

Table continued

Date	Vessel Name	Direction	Date reported reaching Nine Mile Point	Date and Time vessel estimated (a)/ observed (b) reachin study area	
				Date	Time
4/21	Sir J. Dunn	downbound	07:57		
	Fort York	downbound	08:45		
	Elgo Indiana	downbound	10:50		
	Murray Bay	downbound	15:10		
	A.M. Glossbrennen	downbound	16:20		
	Simco	downbound	17:41		

Appendix 4. Incident light (in foot-candles) measured with a submarine photometer at the surface, middle, and bottom at Frechette Point and Six Mile Point, February 16-April 21, 1979.

Incident light (in foot-candles) measured with a submarine photometer at the surface, middle, and bottom at Frechette Point and Six Mile Point, February 16-April 21, 1979. The last column (%) is light measured at the bottom expressed as a percentage of light measured at mid depth in the water column. [Ice thickness not measured (a); broken floe ice only (b).]

Date	Station	Station depth (m)	Time (hours)	Ice thickness (cm)	Incident light (foot-candles)			
					Surface	Middle	Bottom	%
2/16	7a	1	1310	46	5,000	2,800	440	15.7
			1330	46	1,200	370	80	21.6
	7c	1	1310	46	1,000	400	70	17.5
			1330	46	5,500	800	300	37.5
	7d	1	1310	46	1,200	290	42	14.5
			1330	46	1,200	410	83	20.2
3/18	2	1	1500	38	370	140	65	46.4
	4	2	1500	30	320	52	35	67.3
	5	3	1500	24	350	110	52	47.3
	7	1	1445	61	430	170	60	35.3
	9	2	1445	41	370	80	45	56.2
	10	3	1445	27	480	120	66	55.0
	12	1	1415	51	580	250	64	25.6
	14	2	1415	52	450	73	50	68.5
	15	3	1415	46	560	84	42	50.0
	17	1	1400	a	740	180	60	33.3
	19	2	1400	a	760	110	50	45.4
	20	3	1400	a	930	130	49	37.7
4/21[b]	2	1	1100		540	260	190	73.1
			1300		1,700	1,200	710	59.2
			1500		760	580	290	50.0
			1700		540	390	210	53.8
	4	2	1100		530	420	250	59.5
			1300		2,500	910	500	54.9
			1500		820	370	290	78.4
			1700		480	290	170	58.6
	5	3	1100		570	120	52	43.3
			1300		2,000	330	160	48.5
			1500		730	190	77	40.5
			1700		530	140	30	21.4
	9	2	1330		1,300	550	420	76.4
			1530		1,900	870	640	73.6
			1730		330	210	120	57.1
	12	1	1600		1,100	170	25	14.7
			1800		210	39	8	20.5
	14	2	1600		1,200	320	130	40.6
	15	3	1600		940	360	150	41.7
			1800		190	72	21	29.1
	17	1	1630		950	190	43	22.6
			1830		140	4	3	75.0
	19	2	1630		840	420	270	64.3
			1830		140	54	47	87.0
	20	3	1630		1,400	390	250	64.1
			1830		220	52	36	69.2

Appendix 5. Fishing effort and catch at Frechette Point and Six Mile Point in the St. Marys River, January 16-April 21, 1979. [Each lift at a station represents one piece of gear fished overnight for one night; two traps were fished at station 4 on March 17 and April 20.]

Fishing effort and catch at Frechette Point and Six Mile Point in the St. Marys River, January 16 - April 21, 1979. [Each lift at a station represents one piece of gear fished overnight for one night; two traps were fished at station 4 on March 17 and April 20.]

Date gear lifted	Station	Gear	Catch		
			Species	#	Total length (cm)
Jan. 16	14	Gillnet	--	0	-
	19	Gillnet	white sucker	1	34
Feb. 14	9	Fyke net	--	0	-
Feb. 16	14	Fyke net	white sucker	6	35,36,38,40,43,50
March 15	14	Fyke net	white sucker	2	43,44
March 16	9	Fyke net	--	0	-
	14	Fyke net	white sucker	1	44
	19	Fyke net	white sucker	5	39,40,45,46,46
March 17	9	Fyke net	--	0	-
	14	Fyke net	white sucker	2	43,43
	19	Fyke net	burbot	1	67
			white sucker	1	45
	4	Trap	sculpin (Cottus sp.)	4	-
April 18	9	Fyke net	--	0	-
	14	Fyke net	white sucker	7	37,40,41,41,42,43,44
			yellow perch	1	32
	19	Fyke net	lake herring	1	39
			northern pike	1	56
			white sucker	7	38,39,41,44,45,45,46
			longnose sucker	1	41
April 19	4	Fyke net	white sucker	18	36,38,39,39,39,41,41,42,43,43,43,43,44,45,46,46,48,48
			yellow perch	1	31
	9	Fyke net	burbot	3	66,74,76
			white sucker	3	43,46,48
	14	Fyke net	white sucker	1	42
	19	Fyke net	burbot	1	86
			lake herring	1	18
April 20	4	Fyke net	white sucker	2	41,44
		Trap	ninespine stickleback	1	-
			sculpin (Cottus sp.)	1	-

Appendix 6. Comments received on draft report circulated for review on August 6, 1979, by the Great Lakes Basin Commission.

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES
POST OFFICE BOX 1467
HARRISBURG, PENNSYLVANIA 17120

In reply refer to
RM-R
F 110:7

August 16, 1979

David A. Gregorka, Administrative Director
Great Lakes Basin Commission
P. O. Box 999
3475 Plymouth Road
Ann Arbor, Michigan 48106

Dear Mr. Gregorka:

This is in response to your August 6, 1979, request for comments on the two draft reports that are a part of the Environmental Evaluation Work Group FY 1979 Studies of the Winter Navigation Demonstration Program. The drafts are entitled as follows:

1. "Effects of Ship-Induced Waves in an Ice Environment on the St. Marys River Ecosystem"

2. "Environmental Monitoring Plan"

Regarding the first draft, we suggest that the following be added as Item 10 to the Executive Summary on pages i-ii:

> "The report describes and summarizes field observations only. It neither endorses nor implies any conclusions from these observations. Before reliable and valid conclusions can be drawn, more detailed field work must be made to support any hypotheses that may be generated by the report."

Regarding the second draft, the report needs a recommendation as to its application since funding of the monitoring plan is discouraged. We feel that the outlined plan would make an excellent reference in the EAGLE program.

Sincerely,

John E. McSparran for VMB

V. M. Beard, Director
Bureau of Resources Programming